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PALEONTOLOGY.—Stiptocrinus, *a new camerate crinoid genus from the Silurian.*[1]

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In the middle Silurian of the central United States are several species of camerate crinoids that have variously been referred to *Saccocrinus*, *Periechocrinus*, *Carpocrinus* (*"Habrocrinus"*), and *Aorocrinus*. These species cannot be assigned to any described genus. The new genus *Stiptocrinus* is here proposed for their reception.

Stiptocrinus, n. gen.

Genotype.—Stiptocrinus spinosus, n. sp.

Generic diagnosis.—

Crown. The genus is represented by a considerable number of thecae, but the arms are unknown except for their proximal portions.

Theca. As seen, specimens attain a maximum height of approximately 40 mm. In general aspect *Stiptocrinus* strongly resembles characteristic species of *Actinocrinus* from the lower Mississippian. There is a pronounced tendency toward lobation, and the proportions of the cup to tegmen are similar. The dorsal cup is high, averaging about 70 percent of the over-all height of the theca. The dorsal cup ranges from subturbinate to subglobose in shape, with somewhat depressed interradial areas. The tegmen is low and usually has well-defined depressed interambulacral areas. The thecal plates are heavy and typically tumid. The plates of the dorsal cup may be ornamented by discrete subspinous processes, irregular vermicular ridges, or fairly regular radiating ridges. In *S. nodosus* the plates of the dorsal cup are all strongly nodose.

BB. Three subequal elements, usually moderately large and prominent.

RR. In most species the height and breadth of the plates are approximately the same. In some species the height is greater than the breadth. In *S. spinosus* the height is as much as one-third greater than the breadth.

IBrr. The first primibrach is usually considerably smaller than the radial, and the primaxil still smaller.

IIBrr. At least two and in some cases three secundibrachs may be considered as incorporated in the cup. As a rule the *IIBrr* diverge from the wall of the theca, giving the genus its typical lobate form. The secundibrachs are very stout and the two ranges are typically closely appressed laterally so far as preserved. In species where there is a small intersecundibrach, the brachials enclose it completely.

Interradii. The posterior interradius is very much larger than the others. The primary anal is equal in size to the *RR* and is followed by the usual batocrinoid range of three plates. Distad the plates have a somewhat irregular arrangement. There is a median series of plates decreasing in size distad. In most specimens there are but two or three plates in this vertical series, but in a few cases there are more. The posterior interradius reaches its maximum breadth at the level of the third range, which consists of five plates. In the other interradii the first plate is relatively small, followed by two plates in each of the following ranges.

Tegmen. The tegmen is a low, arched, competent structure. It is composed of numerous small stout plates. The anal tube is excen-

[1] Published by permission of the Director, U. S. Geological Survey. Received December 11, 1945.

tric in position. In all specimens known it has been broken off. Judged by the diameter at the base, it was unusually large for crinoids of this size.

Arms. The maximum number of *IIBrr* found in place in any specimen seen is four in series. At this level the two series of a ray are typically closely united. The structure suggests a radial trunk, such as is found in *Melocrinus*. Indeed, some of the specimens found in the collections had been identified as *Melocrinus*. Distad the rami probably separate. Associated with a crushed theca of uncertain specific affinities are two fragments of what appear to be discrete rami. They are laterally displaced, but seem to belong to the specimen. If such be the case, the rami are stout and uniserial.

Column. The column itself is unknown. From the impression on the basals is appears to have been relatively large. In one specimen the lumen shows clearly. It is pentalobate.

Distribution.—*Stiptocrinus* has been recognized in the Cedarville dolomite of Ohio and Indiana, the Racine dolomite of Illinois, the Laurel limestone of Indiana, and the Decatur limestone of Tennessee. There is a specimen in the Springer collection formerly labeled *Dimerocrinus inornatus* and stated to come from the Waldron of Hartsville, Ind. It is a *Stiptocrinus*. At St. Paul, Ind., the specimens seem to come from several horizons and localities. Unfortunately, the original locality labels were not transcribed when the specimens were put in the collections.

Remarks.—The only genus with which *Stiptocrinus* need be compared is *Periechocrinus*. *Saccocrinus*, as based on the type species *Saccocrinus speciosus*, cannot be separated from *Periechocrinus*. *Periechocrinus* has relatively very thin plates and an incompetent tegmen made up of a great many small plates. The plates of the cup, particularly in the radial series, are typically very high in proportion to the breadth. Many of the plates of the higher ranges of the radial series are incorporated in the cup. The anal tube is a short incompetent structure, usually found flattened down on the tegmen. *Stiptocrinus*, as may be seen in the description given above, differs to a marked degrees in all the characters enumerated.

Species referred to the genus.—

Stiptocrinus benedicti (S. A. Miller), n. comb.

Saccocrinus benedicti S. A. Miller, 1892, p. 29, pl. 5, figs, 1, 2, "Niagara Group, at St. Paul, Indiana" (Laurel limestone).—S. A. Miller, 1894, p. 283, pl. 5, figs. 1, 2.—Springer, 1926, p. 46, pl. 10, figs. 6–10 (*non* figs. 11–14).

Periechocrinus ornatus (Hall) (*pars*), Wachsmuth and Springer, 1897, pl. 51, fig. 7.

Not *Habrocrinus benedicti* Slocom (*non* Miller) (=*Stiptocrinus chicagoensis* (Weller), 1908, p. 295, pl. 87, figs. 6, 7.—Foerste (*non* Miller) (=*Stiptocrinus* sp.), 1917, p. 243, pl. 10, figs. 5a, 5b.

This is apparently the most abundant species of *Stiptocrinus* in the Laurel limestone at St. Paul, Ind. There are 30 or more specimens of the species in the Springer collection, not counting 4 specimens figured by Springer, but here removed from the species. At least 15 of these specimens are in good to excellent state of preservation and represent a considerable range in growth stages.

The maximum height of theca among known specimens is shown by one of Miller's types, which gives 30 mm. Most specimens have a height of 25 mm or less.

The characteristics of the species are well shown by Springer's figures (1926, pl. 10, figs. 6–10). The plates of the dorsal cup, as shown in fig. 7 are incorrectly drawn. The radials appear to be considerably higher than wide. Such is not the case, as the dimensions are nearly equal.

Specimens shown in Springer's figs. 11 and 12 have been removed from *S. benedicti* and placed in a new species, *S. spinosus*. Specimen Fig. 13 represents still another species. As shown in the tegminal view it is deeply lobate. *S. benedicti* is only slightly lobate. The dorsal cup of fig. 13 is unlike that of either *S. benedicti* or *S. spinosus*. Specimen fig. 14 is here described as *S. carinatus*.

Stiptocrinus carinatus, n. sp.

Saccocrinus benedicti Springer (*non* Miller) (*pars*), 1926, pl. 10, fig. 14.

This species is given a name chiefly to record its aberrancy in form and ornamentation. As holotype I choose the specimen figured by Springer, pl. 10, fig. 14. The specimen is a fragmentary dorsal cup, preserving the posterior interradius and three rays. The specimen is somewhat crushed. The tegmen is missing, and the wall of the cup is preserved up to and including the first secundibrachs. A smaller

specimen, not figured, has a complete dorsal cup, preserved to the same level as the larger specimen. This will stand as a paratype. There is another specimen, larger than the holotype, poorly preserved, and partially embedded in matrix.

The cup is broader than high, the small specimen having an average diameter of 15 mm and a height of 12 mm. The walls of the cup diverge more widely than any described species of the genus, excepting *S. nodosus*. The typical plate ornamentation consists of sharp carinae radiating from the center of the plate to each angle. This is unusual, as radiating ridges usually run normal to the faces of the plate. The basals bear irregular vermicular rounded ridges.

The widely expanding walls of the dorsal cup and the stellate ornamentation of the plates readily distinguish this species from any described form.

Horizon and locality.—Laurel limestone, St. Paul, Ind. All three specimens are partially silicified and come from a dolomitic limestone.

Types.—The types are in the Springer collection, United States National Museum. Holotype S 4473; paratype S 4474.

Stiptocrinus chicagoensis (Weller), n. comb.

Periechocrinus chicagoensis Weller, 1900, p. 131, pl. 13, figs. 7, 8, Niagaran, Bridgeport and Joliet, Ill. (Racine dolomite).

Habrocrinus benedicti Slocom (*non* Miller), 1908, p. 295, pl. 87, figs. 6, 7.

This is the largest described species of *Stiptocrinus*, the height of the theca ranging up to 40 mm or more. It is difficult to form an adequate picture of the species. Except for the portion of the exterior figured by Slocom, all we have are internal casts. The *RR* are higher than wide, and the primibrachs are relatively larger than in any other described species. There seem to be no intersecundibrachs.

Because of its large size and the proportions of the plates, it would seem advisable to keep this species distinct.

Stiptocrinus farringtoni (Slocom), n. comb.

Habrocrinus farringtoni Slocom, 1908, p. 296, pl. 87, figs. 1–5, "Niagaran limestone—about 1 mile east of Lemont, Illinois" (Racine dolomite).

Stiptocrinus howardi (S. A. Miller), n. comb.

Saccocrinus howardi S. A. Miller, 1892, p. 30, pl. 5, figs. 3–5, "Niagara Group, at St. Paul, Indiana" (Laurel limestone).—S. A. Miller, 1894, p. 284, pl. 5, figs. 3–5.

Habrocrinus howardi (Slocom), 1908, p. 297.—Foerste, 1917, p. 243.

The validity of this species is questionable. Not having seen the specimen itself, I am not competent to pass judgment. In the Springer collection I have chosen one specimen that may represent this species. In form of theca this specimen resembles *S. benedicti*, and the ornamentation is similar. The theca, however, is strongly lobate, and there are no intersecundibrachs. It does not have the broadly truncate base and subcylindrical cup described by Miller. Indeed, in a hundred or more specimens of *Stiptocrinus* from St. Paul I have seen no specimens corresponding to Miller's.

Stiptocrinus nodosus (Springer), n. comb.

Aorocrinus nodosus Springer, 1926, p. 47, pl. 10, figs. 16, 16a, 16b, "Decatur limestone, Niagaran; below Grandview, 10 miles above Clifton on the Tennessee River, Perry County, Tennessee."

I think there can be little doubt that this species is referable to *Stiptocrinus*. The radial series is not preserved beyond the first secundibrachs, but all the structures shown agree with those of the genus.

Stiptocrinus spinosus, n. sp.

Saccocrinus benedicti Springer (*non* S. A. Miller) (*pars*), 1926, pl. 10, figs. 11, 12.

There are 15 specimens of this species in the Springer collection, two of them figured by Springer as *Saccocrinus benedicti*, as noted above. The specimen illustrated by fig. 11 is chosen as holotype of *Stiptocrinus spinosus*. The other specimen (fig. 12) will stand as a paratype.

This is one of the smaller species of the genus. The theca of the holotype, an adult individual, has a height of 20 mm, which seems to be about average for the species. The paratype, an imperfect specimen lacking the tegmen and *IIBrr*, would have had a height somewhat greater than this.

The theca is strongly lobate, more so than any described species of the genus. The dorsal cup is high, making up about four-fifths the over-all height of the theca. The sides of the cup diverge evenly at an angle of about 45°. The tegmen is low, with strongly depressed interambulacral areas.

In the dorsal cup perhaps the most characteristic feature of the species is the proportionally very large radial, and its considerable excess in height over breadth. In the holotype the average height of the radials is approximately one-third greater than the breadth. The secundibrachs diverge sharply from the wall of the cup, giving the strongly lobate form characteristic of the species. There are no intersecundibrachs.

The ornamentation of the plates of the cup is unlike that of any known species. In the holotype each basal element bears a pair of subspinous processes. In gerontic individuals, such as the paratype, there is a considerable accretion of sterom. The space between the processes is partially filled, and the lateral elevations are extended distad as rounded ridges. Subsidiary spinous processes may also appear. The radials and the primary anal each typically bear a subcentral spinous process. In gerontic forms two or three less elevated nodes appear below the central node, and low rounded ridges may develop. Each of the first primibrachs bears a central node that tends to extend laterally into a ridge. The plates of the interradial series also have more or less sharply defined central nodes. The pronounced lobation, lack of intersecundibrachs, spinous ornamentation, and the relatively narrow straight-sided dorsal cup clearly distinguish *S. spinosus* from *S. benedicti*. The shape of the cup and the ornamentation are quite unlike that seen in *S. howardi*.

Horizon and locality.—Laurel limestone, St. Paul, Ind. Two specimens can be placed more accurately as from the "State House Quarry."

Types.—The holotype and paratype are in the Springer collection, United States National Museum. Holotype S 4471; paratype S 4472.

The following two specimens will be noted merely because of their stratigraphic position and publication. Neither, owing to poor preservation, can be determined specifically.

Stiptocrinus sp.

Habrocrinus benedicti Foerste (*non* Miller), 1917, p. 243, pl. 10, figs. 5a, 5b, "Muncie, Indiana, above the horizon of the Cedarville dolomite."

This is a large species, fully as large as *S. chicagoensis* and similar to that species.

Stiptocrinus sp.

Habrocrinus sp. Foerste, 1917, p. 242, pl. 10, fig. 6, "Cedarville dolomite—Mills Quarry, one mile southwest of Springfield, Ohio."

This specimen is of medium size and strongly lobate. It most nearly resembles *S. spinosus*, but the walls of the cup diverge more widely, and it is much larger than any known *S. spinosus*. The ornamentation seems to consist of irregular vermicular ridges.

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BOTANY.—*New Asiatic species of the legume genus* Campylotropis.[1]

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The species of *Campylotropis*, long included in the genus *Lespedeza*, are now generally recognized as composing a separate genus distinguished by flowers single at an axil and the keel geniculate instead of somewhat curved. About 66 valid species are known, which are almost entirely limited to the Provinces of Yunnan and Szechwan in China.

Scarcity of herbarium material and probable destruction of many types in Germany during the war will make adequate treatment of the genus difficult unless satisfactory duplicate types can be found, but from supposed duplicates of type numbers in American herbaria it is evident that there has been a mixup in the distribution of supposedly authentic material in many cases. Most descriptions in question are, however, fairly complete, and between them and the considerable number of sheets of types and paratypes examined it is believed that there is little probability of any of the accompanying 12 new species having been previously described.

Photographs of type sheets and natural size photographs of the flowers, leaves, and pods have been deposited in the herbaria of the New York Botanical Garden, Bailey Hortorium, Arnold Arboretum, Gray Herbarium, and Missouri Botanical Garden, unless the type sheets have been designated in these herbaria; the photographs are available as exchange for type photographs from other large herbaria.

Campylotropis brevifolia Ricker, sp. nov.

Erect shrubs with gray, densely tomentose stems; petioles up to 1 cm long; leaflets obovate to obcordate, up to 12×16 mm, minutely puberulent and dark green above, densely gray-tomentose below; racemes short, few-flowered, axillary and terminal, flowers rose-purple, calyx densely gray-tomentose, 3–4 mm long, teeth acute, about equaling the tube, standard 8–10 mm long, keel and wings shorter; pods unknown.

Frutex erectus, caule griseo-tomentoso. Foliola obovata vel obcordata usque ad 12×16 mm, superne subglaberrima, subter dense griseo-tomentosa. Racemi brevi, axillares, sparsiflori; corolla roseo-purpurea, ca. 8–10 mm longa; calyx dense griseo-tomentosus, 3–4 mm longus, laciniis acutis, tubo subaequilongis.

Type no. (953) 5604, Dr. H. F. v. Handel-Mazzetti, in valley of Yalung River between Datung and Delifu, Szechwan, China, October 14, 1914, in Herbarium of the Arnold Arboretum. Also Szechwan, T. T. Yu, no. 1450, October 20, 1932. Altitude 1,600 m.

Somewhat resembling *C. stenocarpa* (Maxim.) Schindl., but that species has the calyx teeth about twice longer than the tube.

Campylotropis filipes Ricker, sp. nov.

Shrubby, few branches, stems erect, striate, sparingly appressed, pubescent to glabrous, 10–30 dm tall. Stipules linear-lanceolate, 5–6 mm long; petioles 2.5–3 cm long; leaflets narrowly elliptic, lateral nearly sessile, sparingly pubescent to glabrous above and below, .4–1.3×2.2–5.2 cm, acute to obtuse at both ends, mucronate. Peduncles about 1.5 cm long; racemes terminal and axillary, 3–4 cm long; pedicels slender, appressed pubescent, 7–8 mm long; calyx hirsute, about 3 mm long, teeth mucronate, about equaling the tube; flowers reddish-purple (note on specimen); pods glabrous, margin ciliate, oblanceolate, about 4×9 mm.

Suffrutex, ramis paucis, caule erecto, 10–30 dm alto. Foliola angusto-elliptica, subsessilia, .4–1.3×2.2–5.2 cm. Racemi axillares et terminales, 3–4 cm longi. Calyx hirsutus, ca. 3 mm longus, laciniis mucronatis, tubo subaequilongis. Corolla ignota. Legumen oblanceolatum ca. 4×9 mm, margine ciliato.

Type no. 14832, T. T. Yu, Muli, Guhtzum, Yunnan, China, December 4, 1937, in Herbarium of the Arnold Arboretum. Altitude 3,100 m.

In the absence of the flowers the single fruiting pedicel at an axis distinguishes this from *Lespedeza*, and the habit and leaflets are entirely different from anything seen elsewhere in the genus *Campylotropis*.

[1] Received December 14, 1945.

Campylotropis gracilis Ricker, sp. nov.

Slender shrubs, branches erect to decumbent, new growth angular and densely tomentose, older growth becoming woody and sparingly tomentose; leaves thin, chartaceous, sparingly pubescent above, glabrous and appressed-pubescent below, petioles equaling the leaflets; leaflets oblanceolate to elliptic, up to 2.1×5 cm, apex retuse and mucronate, terminal leaflet larger; inflorescence axillary and terminal, up to 6 cm long, peduncle tomentose, pedicels slender, tomentose, 0.5–1 cm long; flowers few, (rosy?); calyx 3–4 mm long, tomentose, teeth linear-lanceolate, about equaling the tube; standard about 1.1 cm long, equaling the keel, wings shorter; pod unknown.

Frutex gracilis, ramis erectis vel decumbentibus, angulatis, dense tomentosis. Foliola elliptica vel oblanceolata usque ad 2.1×5 cm, apice retusa et mucronata. Flores pauci, calyx 3–4 mm longus, tomentosus, laciniis linearilanceolatis, tubum subaequantibus. Vexillum ca. 1.1 cm longum. Carina alas superans.

Type no. 6508, Dr. A. Henry, Hupeh, China, 1885–88, in Gray Herbarium.

Most nearly resembling *C. polyantha* (Fr.) Schindl., but that species has leaflets that are glabrous above and shorter; it also has longer calyx teeth and more spreading pubescence on the pedicels.

Campylotropis hersi Ricker, sp. nov.

Shrub with long, erect, unbranched new growth (all seen) and closely and finely appressed-pubescent stems; stipules subulate, 4–5 mm long, petioles up to 2 cm long; leaflets elliptic to ovate, apex obtuse or acute to emarginate and mucronate; racemes axillary and terminal, 4–5 mm, cone-like buds only developed. Flowers and pods unknown.

Frutex erectus, ramis dense appresse pubescentibus. Stipulae subulatae, 4–5 mm longae. Petioli usque ad 2 cm longi, foliola elliptica usque ovata, apice obtuse usque acuta vel emarginata. Racemi axillares et terminales.

Type no. 1601, Joseph Hers, Nankow Pass, northern Chihli, China, August 15, 1921, in Herbarium of the Arnold Arboretum.

Campylotropis huberi Ricker, sp. nov.

Erect shrubs, with stem many-angled, appressed-canescent. Leaves membranaceous, stipules subulate, canescent, 4 mm long; petioles 2–4 cm long, canescent; leaflets elliptic-oblong, narrowly obtuse at both ends, up to 1.7×5 cm, sparingly puberulent to glabrous above, appressed grayish-pubescent below. Racemes axillary and terminal, peduncle up to 6 cm long with spreading fuscous pubescence, flowers crowded on the upper half; calyx 3 mm long, teeth acute, 1 mm long; corolla purple, 10–11 mm long, wings 9–11 mm long. Pod unknown.

Frutex erectus, caule multiangulato, adpresse canescente. Folia membranacea; stipulae subulatae, canescentes, ca. 4 mm longae; petioli 2–4 cm longi; foliola elliptico-oblonga usque ad 1.7×5 cm. Racemi axillares et terminales, pedunculo usque ad 6 cm longo; calyx 3 mm longus, laciniis acutis 1 mm longis; corolla purpurea, 10–11 mm longa, alis 9–10 mm longis.

Type no. B46=746, W. Huber, June 16, 1868, ex Herbarium Meisner, in Herbarium of the New York Botanical Garden. No locality given but probably vicinity of Yunnan or Szechwan, as most of the known species are from that area.

The shape of the leaflets is quite characteristic and distinct from that of any species seen.

Campylotropis longepedunculata Ricker, sp. nov.

Erect shrub 1.2 m tall, young stems angular and densely tawny hirsute; petioles about half the length of the leaflets, densely hirsute; leaflets elliptic to oblong-elliptic, up to 3.2×6.7 cm long, dark green and glabrous above, light green and closely pubescent below, apex retuse and mucronate; racemes terminal and axillary, peduncles mostly 11–19 cm long; flowers purple, numerous on the upper half, pedicels slender, hirsute, mostly 5–8 mm long; calyx hirsute, 4–5 mm long, teeth acuminate, equaling or slightly longer than the tube; standard 8–9 mm long, keel and wings nearly equaling the standard; pods about 4×10 mm, elliptic, acute, hirsute.

Frutex erectus, caule angulato, dense fulvo-hirsuto; petioli foliolis dimidio breviores, dense hirsuti; foliola elliptica vel oblongo-elliptica usque ad 3.2×6.7 cm, apice retusa et mucronata. Calyx hirsutus, 4–5 mm longus, laciniis acuminatis, tubo subaequilongis; corolla purpurea, 8–9 mm longa. Legumen ca. 4×10 mm, ellipticum, acutum, hirsutum.

Type no. 6108, Y. Tsiang, Lung-bing, Tuyun, Kweichow, China, July 28, 1930. Also no. 8407, Y. Tsiang, Lungli, Kweichow, China, July 4, 1930. Both in Herbarium of the Arnold Arboretum.

Most nearly resembling *C. grandifolia* Schindler, but that species has the young growth glabrous or sparingly pubescent, the leaflets sparingly pubescent below, the inflorescence with spreading pubescence, and the pods obtuse.

Campylotropis mortolana Ricker, sp. nov.

Erect shrub with branches at first appressed-pubescent; lower petioles as long as the leaves; stipules linear-lanceolate, about 3 mm long; leaflets elliptic to obovate, apex and base often acute, up to 2×4.5 cm, glabrous above, sparingly pubescent to glabrous beneath; inflorescence of short terminal (and axillary?) racemes; pedicels stout, 3–4 mm long, with spreading pubescence; calyx about 3 mm long, teeth 1 mm long, broadly acute; standard about 1 cm long (purple or violet?), keel 1 cm long, wings somewhat shorter; pods unknown.

Frutex erectus, ramis adpresse pubescentibus. Stipulae lineari-lanceolatae, ca. 3 mm longae; foliola elliptica vel obovata, apice et basi saepe acuta, usque ad 2×4.5 cm, superne glabra, subter parce pubescentia. Calyx ca. 3 mm longus, laciniis acutis, 1 mm longis; corolla ca. 1 cm longa.

Type sheet in Arnold Arboretum from herbarium of Camillo Schneider collected at La Mortola Garden in Italy, August 1903, bearing the name *Indigofera macroptera* which suggests that the labels were mixed in mounting. The species is most certainly from China and probably from the Provinces of Yunnan or Szechwan which are the centers of distribution of most of the species of Campylotropis.

The species most nearly suggests *C. prainii* but we have not seen the frequently acute apex leaflets in that species. The petioles and pedicels in that species are long and slender, the leaflets usually much darker colored, at least in drying, and the inflorescence not so compact, and it has many conspicuous long linear-lanceolate bractlets not found in *C. mortolana*.

Campylotropis nepalensis Ricker, sp. nov.

Small erect shrubs with much branched tomentose stems; leaves very short petioled (2–3 mm); stipules 3 mm long, linear-lanceolate; leaflets thick, broadly cuneate, apex obtuse, mucronate and often retuse, up to 10×15 mm, glabrous above and veins very prominent, reticulated, tomentose beneath. Inflorescence in short axillary racemes, pedicels slender, ciliate, about 5 mm long; flowers (rose purple?), calyx hirsute, 4–5 mm long, teeth lanceolate, about equaling or somewhat longer than the tube, standard 8–10 mm long, keel and wings shorter; pod unknown.

Suffrutex, ramosissimus, tomentosus. Stipulae lineari-lanceolatae, 3 mm longae; foliola coriacea, late cuneata, apice obtusa, mucronata, saepe retusa, usque ad 10×15 mm, superne glabra, subter tomentosa. Calyx hirsutus, 4–5 mm longus, laciniis tubo subaequilongis; corolla (roseo-purpurea?) 8–10 mm longa, carina et alis longior.

Type no. 59, Bis Ram Chaumala, West Nepal, India, March 23, 1929, in Herbarium of Arnold Arboretum.

The general appearance of the plant resembles *C. stenocarpa* (Klotzsch) Schindler, which has long, terminal, axillary racemes of flowers, conspicuous close, broadly lanceolate, hirsute bractlets, and with the leaflets less conspicuously reticulated and much more densely tomentose beneath.

Campylotropis purpurascens Ricker, sp. nov.

Shrubs 9–15 dm tall, branches striate, densely velvety. Stipules linear-lanceolate, 6–7 mm long; petioles up to 2 cm long; leaflets coriaceous, elliptic, mucronate, velutinous above, densely sericeous below, up to 1.9×2.8 cm. Racemes arcuate, up to 8 cm long; rhachis hispid, flowering nearly to the base. Calyx about 3 mm long, appressed-pubescent, teeth arcuate, about equaling the tube; corolla 7–8 mm long, purplish-blue. Fruits unknown.

Frutex 9–15 dm altus, ramis striatis, dense velutinis. Stipulae lineari-lanceolatae, 6–7 mm longae; petioli usque ad 2 cm longi; foliola coriacea, elliptica, mucronata, superne velutina, subter dense sericea, usque ad 1.9×2.8 cm. Calyx ca. 3 mm longus, adpresse pubescens, laciniis acutis, tubo subaequilongis; corolla 7–8 mm longa, purpureo-coerulea.

Type no. 17571, T. T. Yu, Shunning, Hila, Yunnan, China, September 9, 1938, in Herbarium of the Arnold Arboretum. Not closely resembling any other species of *Campylotropis*,

but the leaf shape and raceme branches suggest *Lespedeza thunbergii* (Vogel) Koehne, except for the velvety and silky characters of the leaflets.

Campylotropis reticulata Ricker, sp. nov.

Erect shrub, about 6 dm tall, branches angular, densely tomentose; leaves glabrous and with conspicuous, small reticulations above, appressed-pubescent below; stipules linear-lanceolate, villose, 4 mm long; petioles villose, up to 1.5 cm long; leaflets oblanceolate to elliptic, coriaceous, up to 1.2×2.2 cm; inflorescence axillary and terminal, racemes about equaling the peduncle, 2–3 cm long; flowers pink; calyx hirsute, about 3 mm long, teeth linear-lanceolate, equaling the tube; standard about 8 mm long, equaling the keel, wings shorter; pods elliptic, acute, hirsute, margin closely ciliate, about 8 mm long.

Frutex erectus, ca. 6 dm altus; ramis angulatis, dense tomentosis. Foliola oblanceolata usque elliptica, coriacea, usque ad 1.2×2.2 cm. Calyx hirsutus, ca. 3 mm longus, laciniis linearis-lanceolatis tubo aequilongis; vexillo ca. 8 mm longo, carina aequilongo, alis brevioris. Legumen ellipticum, acutum, hirsutum, marginum ciliatum, ca. 8 mm longum.

Type no. 9626A, A. Henry, Meng-tsze, Yunnan, China, in U. S. National Herbarium.

C. reticulata most nearly resembles *C. eriocarpa* (DC.) Schindl. but is at once distinguished by the conspicuous small, oval reticulations of the leaflets. In *C. eriocarpa* the reticulations are less conspicuous, and much more elongated, and the leaflets are darker colored. Henry's no. 9626, with appressed-pubescent stems, which is mounted on the same sheet, is *C. neglecta* Schindl.

Campylotropis smithi Ricker, sp. nov.

Shrubby, branches appressed-pubescent, many angled; petioles nearly as long as the leaves, stipules lanceolate; leaflets elliptic, up to 1.1×1.8 cm, glabrous above, pubescent beneath; racemes terminal and axillary, up to 6 cm long; flowers rose-purple; pedicels up to 5 mm long, calyx hispidulous, about 5 mm long, teeth lanceolate, about equaling the tube; standard about 1 cm long, keel and wings shorter; pods unknown.

Suffrutex, ramis adpresse pubescentibus, multiangulatis. Folia petiolo subaequilonga; stipulae lanceolatae; foliola elliptica usque ad 1.1×1.8 cm, superne glabra, subter pubescentia. Flores roseo-purpurea, pedicelli usque ad 5 mm longi; calyx ca. 5 mm longus, hispidulus, laciniis lanceolatis tubo subaequilongis, vexillum ca. 1 cm longum, carina et alis breviore.

Type no. 2268, Harry Smith, near Ta-tien, Szechwan, China, July 2, 1922, in Herbarium of the Arnold Arboretum. A fragmentary specimen with somewhat obovate obtuse pods from Yunnan, T. T. Yu, no. 14885, may belong to this species.

C. smithi suggests a small-leaved form of *C. sargentii* Schindler, but our species has quite a different type of pubescence on the calyx teeth, the flowers are smaller, and the leaflets more densely pubescent below.

Campylotropis wangi Ricker, sp. nov.

Erect shrub, stems glabrous below, sparingly appressed pubescent above; petioles about 1 cm long, appressed-pubescent, leaflets elliptic up to 1.2×3.3 cm, glabrous above, sparingly pubescent below; racemes axillary and terminal, glandular-tomentose, peduncles about equaling the leaves, pedicels 4–6 mm long; calyx strigose, 4–5 mm long, teeth acuminate, about equaling the tube; flowers pale purplish to reddish, about 1 cm long, keel and wings equal, standard about 9 mm long; pods elliptic, about 4×9 mm, puberulent, margin ciliate.

Frutex erectus, caulibus subter glabris, superne sparse adpresse pubescentibus. Petiolus ca. 1 cm longus; foliola elliptica usque ad 1.2×3.3 cm, superne glabra, subter sparse pubescentia. Calyx strigosus, 4–5 mm longus, laciniis acuminatis tubo subaequilongis. Flores pallido-purpurei usque rubescentes, ca. 1 cm longi, aliis carinam aequantibus, vexillo ca. 9 mm longo. Legumen ellipticum ca. 4×9 mm, puberulentum, margine ciliata.

Type no. 70331, C. W. Wang, A-tun-tze, Yunnan, China, 1,300–3,000 m elevation, September 1935, in Herbarium of the Arnold Arboretum, and probably no. 63456, C. W. Wang, Ta-li Hsien, May 1935.

Somewhat resembling *C. capillipes* (Franch.) Schindler, but leaflets more elongated and peduncles and pedicels with spreading glandular pubescence instead of appressed.

ENTOMOLOGY.—*Synoptic revision of the United States scarab beetles of the subfamily Dynastinae, No. 3: Tribe Oryctini (part).*[1] LAWRENCE W. SAYLOR, Research Associate, California Academy of Sciences.

This paper is the third in the series covering the United States dynastine scarab beetles and includes the four genera differentiated in the following key:

1. Apex clypeus acute and definitely *bidentate*, the teeth often worn and nearly obsolete . . 2
   Apex clypeus acute, either sharply or bluntly so, but never bidentate 3
2. Mandibles definitely *tridentate* externally, the basal tooth often worn and barely visible; thorax not more than two-thirds the length of the elytra; color rufous to rufocastaneous or rufopiceous . . . . . *Ligyrus* Burmeister
   Mandibles *bidentate* externally (caution: examine from below and laterally to avoid counting the lacinia teeth as third teeth of the mandible); thorax about three-fourths the length of the elytra; color always black. *Euetheola* Bates
3. Thorax never foveate; mandibles large and evenly rounded externally, never toothed; coloration piceous to piceocastaneous, rarely rufocastaneous . . . . . *Aphonides* Rivers
   Thorax always foveate at midapex, and with midapical tubercle; mandibles tridentate externally; coloration bright rufous and strongly shining . . . . . *Oxygrylius* Casey

Genus Ligyrus Burmeister

Ligyrus Burmeister, 1847, p. 542; Casey, 1915 p. 178; Ritcher, 1944, p. 25 (larvae); Hayes, 1917, p. 253 (biology).
Tomarus Erichson, 1847, p. 95.
Ligyrodes Casey, 1915, p. 178; Arrow, 1937, p. 35.
Grylius Casey, 1915, p. 189.
Anagrylius Casey, 1915, p. 204.
Ligyrellus Casey, 1915, p. 206.
Euligyrus Casey, 1915, p. 185.

This American genus includes 52 species, according to Arrow (1937), but many of them are not valid; of the 37 names now being used for our United States species (30 of them Casey's), there are in reality only six valid species, one of these being formerly known only from Mexico and the other a West Indian species probably recorded from the States by error.

KEY TO UNITED STATES LIGYRUS

(Males have last abdominal sternite emarginate apically)

1. First elytral interval very wide next to scutellum, and very smooth, usually entirely impunctate, rarely with a dozen or so very minute and highly scattered punctures; male front claw simple and not enlarged; color rufous to piceous; size large (18–27 mm); known from Baja California and Mexico, to Honduras; rare in Arizona (Fig. 1, *i*) . . . . . *laevicollis* Bates
   First elytral interval always coarsely and moderately densely punctured 2
2. Most of discal thoracic area very smooth and with scattered, very fine punctures; clypeal base with two widely separated tubercles; male front claws simple; color piceous; size large (21–25 mm); Florida (Fig. 1, *j*). *subtropicus* Blatchley
   Size variable, rarely as large as 18 mm; puncturation of thorax very variable but center basal area always with at least a dozen or so coarse punctures 3
3. Basal clypeal carina always erect and distinct (unless worn) and never interrupted at middle; male front claws always *simple* and not enlarged; pygidium very densely, finely, and scabrosely punctate both near and *at* basal corners and often the same along basal margin; rest of pygidial disc polished and finely punctate but very variable in density of puncturation; mid-apex of thoracic disc almost always with a small fovea immediately behind the small marginal tubercle; widespread over United States, Baja California, and northern Mexico (genitalia, Fig. 1, *e*) . . . *gibbosus* (DeGeer)
   Basal carina of clypeus always noticeably interrupted at middle, and usually widely so, frequently appearing bituberose; male front claws simple or enlarged; pygidial puncturation very variable, if scabrose then very grossly so 4
4. Male front claws simple and not enlarged; pygidial puncturation at corners very coarse but punctures usually not contiguous except right at corners, puncturation of disc very coarse and only moderately dense; West Indies (probably not United States) (genitalia, Fig. 1, *f*) . . . . . *cuniculus* Fabricius
   Male front claws *enlarged* and the inner claw larger and reflexed; pygidial puncturation of female not as above 5
5. Pygidial puncturation exceedingly dense and scabrose over nearly all the disc, only a small midapical area less densely punctured; Eastern United States, rare to Arizona (genitalia, Fig. 1, *h*) . . . . . *relictus* Say
   Pygidial puncturation very coarse but not at all dense and with smooth areas between the punctures even right at the pygidial basal angles; United States (Texas) and Mexico to Costa Rica (genitalia, Fig. 1, *g*) . . *sallei* Bates

[1] Received September 27, 1945.

Ligyrus relictus Say

Ligyrus relictus Say, 1825, p. 194; Horn, 1875, p. 143; Casey, 1915, p. 183 (*Ligyrodes*); Ritcher, 1944, p. 22 (*Ligyrodes*) (larvae).
Ligyrodes clypealis Casey, 1915, p. 181. (New synonymy.)
L. parviceps Casey, 1915, p. 182. (New synonymy)
L. quadripennis Casey, 1915, p. 182. (New synonymy.)
L. vernicollis Casey, 1915, p. 182. (New synonymy.)
L. dawsoni Casey, 1924, p. 334. (New synonymy.)

Rather widely distributed in the midwestern and eastern States; I have seen specimens from Rhode Island, New Jersey, Pennsylvania, Iowa, Indiana, Kansas, and Nebraska. It occurs also rarely west of Kansas and I have seen specimens from Arizona. The larvae feed in old manure piles and soils rich in humus. The male enlarged front claw, the large size, and dark color will readily place the species over much of its range. The genus *Ligyrodes* erected for this species by Casey is not valid, since the characters apply only to the male sex and so females could not be properly placed.

Ligyrus sallei Bates

Ligyrus sallei Bates, 1888, p. 318.
L. aztecus Casey, 1915, p. 184. (New synonymy.)
L. propinquus Casey, 1915, p. 183. (New synonymy.)

This common Central American (Mexico, Guatemala, Nicaragua, and Costa Rica) species occurs sparingly in the United States; I have seen specimens from Brownsville, Tex. It can be confused in the male only with *relictus*, since both have the enlarged front claw, but the male genitalia are quite different, and the color of *sallei* is more rufous and more highly polished.

Ligyrus cuniculus (Fabricius)

Geotrupes cuniculus Fabricius, 1801, p. 20.
Heteronychus tumulosus Burmeister, 1847, p. 101; Bates, 1888, p. 315 (*Ligyrus*); Casey, 1915, p. 205 (*Anagrylius*); Arrow, 1900, p. 181 (*Ligyrus*).
Ligyrus antillarum Beauvois, 1805, p. 104.

This common West Indian species was said to be from "Nord-America, Sud-Carolina" and "Westindien, St. Domingo," and the original description was based on a specimen obtained from a dealer. Since the species is well known in the West Indies but has apparently not since been taken in the United States, it is time to remove it from our lists. Should it ever occur, the male genitalic drawings will readily place the species. Bates records it from Mexico, British Honduras, and South America, but these records may refer to other, allied species.

Ligyrus gibbosus (DeGeer)

Scarabaeus gibbosus DeGeer, 1774, p. 322; Casey, 1915, p. 204 (*Ligyrus*); Ritcher, 1944, p. 25 (larvae) (*Ligyrus*); Comstock, 1880, p. 274 (biology); Hayes, 1917, p. 253 (biology).
Podalgus variolosus Burmeister, 1855, p. 121.
P. juvencus Burmeister, 1855, p. 121.
Geotrupes juvencus Fabricius, 1775, p. 32.
Ligyrus juvencus Burmeister, 1855, p. 542.
L. morio LeConte 1848, p. 20; Horn, 1875, p. 143.
Bothynus obsoletus LeConte, 1848, p. 87. (New synonymy.)
B. neglectus LeConte, 1848, p. 87. (New synonymy.)
Ligyrus puncticauda Casey, 1915, p. 195. (New synonymy.)
L. arizonensis Casey, 1915, p. 201. (New synonymy.)
L. brevipes Casey, 1915, p. 202. (New synonymy.)
L. breviusculus Casey, 1915, p. 196. (New synonymy.)
L. lacustris Casey, 1915, p. 196. (New synonymy.)
L. californicus Casey, 1915, p. 203. (New synonymy.)
L. laticollis Casey, 1915, p. 203. (New synonymy.)
L. curtipennis Casey, 1915, p. 199. (New synonymy.)
L. effetus Casey, 1915, p. 200. (New synonymy.)
L. farctus Casey, 1915, p. 200. (New synonymy.)
L. laetulus Casey, 1915, p. 197. (New synonymy.)
L. laevicauda Casey, 1915, p. 202. (New synonymy.)
L. laticauda Casey, 1915, p. 197. (New synonymy.)
L. longulus Casey, 1915, p. 193. (New synonymy.)
L. parallelus Casey, 1915, p. 194. (New synonymy.)
L. remotus Casey, 1915, p. 194. (New synonymy.)
L. rubidus Casey, 1915, p. 198. (New synonymy.)
L. lucublandus Casey, 1915, p. 199. (New synonymy.)
L. scitulus Casey, 1915, p. 203. (New synonymy.)
L. spissipes Casey, 1909, p. 283. (New synonymy.)
L. texanus Casey, 1915, p. 195. (New synonymy.)
L. virginicus Casey, 1915, p. 193. (New synonymy.)
L. bicorniculatus Casey, 1915, p. 198. (New synonymy.)

The great variability in size, color, and sculpturing, as well as the worn surface commonly found in this species due to its digging habits (giving the specimens a superficially

different appearance), probably was instrumental in causing Casey to name every trifling variant. The specimens also vary greatly depending on the richness of the food supply in the larval state; thus I have seen large series in which the specimens were all much reduced in size and very similar, but which had all been collected soon after emergence from a small

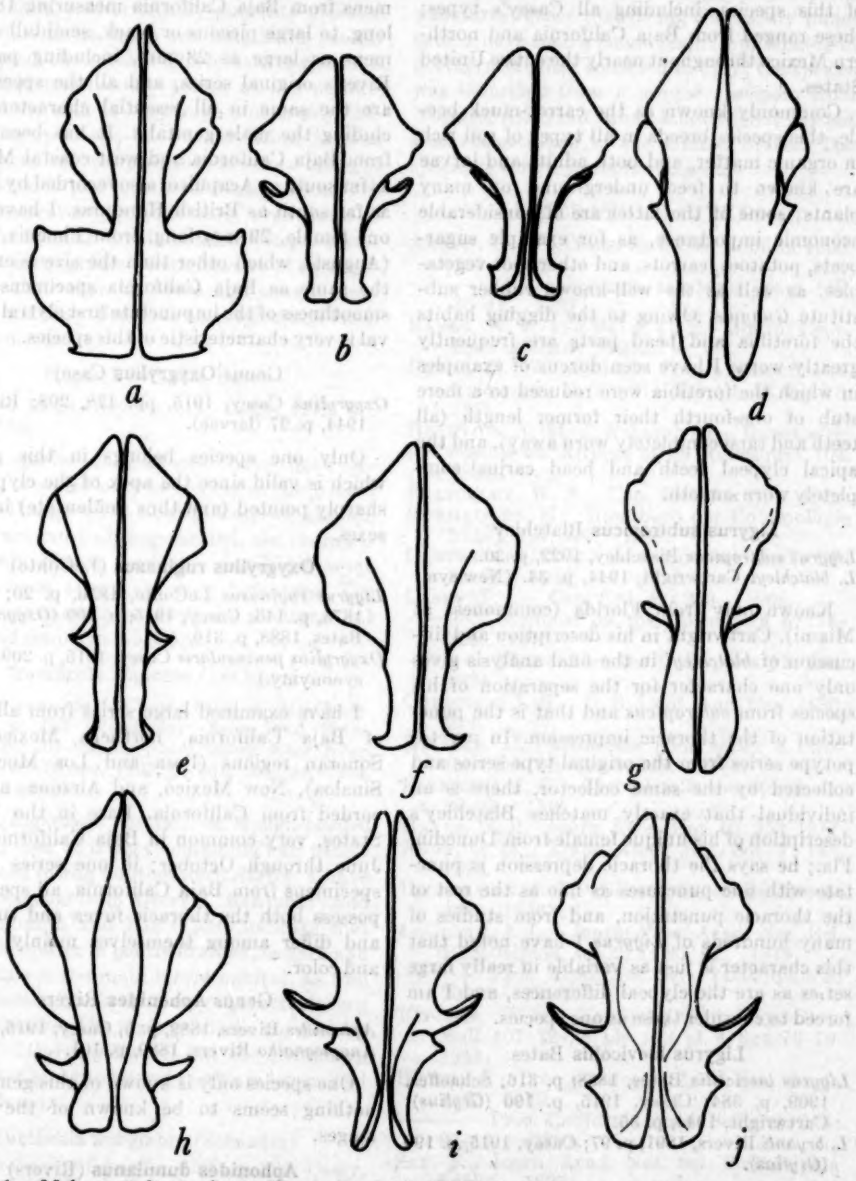

FIG. 1.—Male genitalia: *a*, *Oxygrylius ruginasus*; *b*, *Euetheola rugiceps*; *c*, *E. subglabra*; *d*, *Aphonides dunnianus*; *e*, *Ligyrus gibbosus*; *f*, *L. cuniculus*; *g*, *L. sallei*; *h*, *L. relictus*; *i*, *L. laevicollis*; *j*, *L. subtropicus*.

manure pile where the food (when they were larvae) had been very scanty; others taken from rich soil are frequently large and dark-colored. I have studied over 1,300 specimens of this species, including all Casey's types; these ranged from Baja California and northern Mexico throughout nearly the entire United States.

Commonly known as the carrot-muck beetle, this species breeds in all types of soil rich in organic matter, and both adults and larvae are known to feed underground on many plants; some of the latter are of considerable economic importance, as for example sugar-beets, potatoes, carrots, and other root vegetables, as well as the well-known rubber substitute *Guayule*. Owing to the digging habits the foretibia and head parts are frequently greatly worn; I have seen dozens of examples in which the foretibia were reduced to a mere stub of one-fourth their former length (all teeth and tarsi completely worn away), and the apical clypeal teeth and head carina completely worn smooth.

Ligyrus subtropicus Blatchley

Ligyrus subtropicus Blatchley, 1922, p. 30.
L. blatchleyi Cartwright, 1944, p. 34. (New syn.)

Known only from Florida (commonest at Miami). Cartwright in his description and discussion of *blatchleyi* in the final analysis gives only one character for the separation of his species from *subtropicus* and that is the punctation of the thoracic impression. In my topotype series from the original type series and collected by the same collector, there is an individual that exactly matches Blatchley's description of his unique female from Dunedin, Fla.; he says the thoracic depression is punctate with fine punctures as fine as the rest of the thoracic punctation, and from studies of many hundreds of *Ligyrus* I have noted that this character is just as variable in really large series as are the clypeal differences, and I am forced to consider these as one species.

Ligyrus laevicollis Bates

Ligyrus laevicollis Bates, 1888, p. 316; Schaeffer, 1909, p. 384; Casey, 1915, p. 190 (*Grylius*); Cartwright, 1944, p. 35.
L. bryanti Rivers, 1891, p. 97; Casey, 1915, p. 190 (*Grylius*).

Schaeffer was the first to synonymize *bryanti* and *laevicollis*, and rightfully so. Casey then resurrected the species, and, *bryanti* being rare in collections, no one has studied it adequately since. I have examined and dissected series including small, rufous, highly polished specimens from Baja California measuring 18 mm long, to large piceous or black, semidull specimens as large as 28 mm, including part of River's original series, and all the specimens are the same in all essential characters, including the male genitalia. It has been seen from Baja California and west coastal Mexico as far south as Acapulco; also recorded by Bates as far south as British Honduras. I have seen one female, 29 mm long, from Phoenix, Ariz. (August), which other than the size is exactly the same as Baja California specimens. The smoothness of the impunctate first elytral interval is very characteristic of this species.

Genus **Oxygrylius** Casey

Oxygrylius Casey, 1915, pp. 178, 208; Ritcher, 1944, p. 27 (larvae).

Only one species belongs in this genus, which is valid since the apex of the clypeus is sharply pointed (and thus unidentate) in both sexes.

Oxygryilus ruginasus (LeConte)

Ligyrus ruginasus LeConte, 1856, p. 20; Horn, 1875, p. 143; Casey, 1915, p. 209 (*Oxygrylius*); Bates, 1888, p. 316.
Oxygrylius peninsularis Casey, 1915, p. 209. (New synonymy.)

I have examined large series from all parts of Baja California, northern Mexico and Sonoran regions (Posa and Los Mochis in Sinaloa), New Mexico, and Airzona; also recorded from California. Rare in the United States, very common in Baja California from June through October; in one series of 216 specimens from Baja California, all specimens possess both the thoracic fovea and tubercle, and differ among themselves mainly in size and color.

Genus **Aphonides** Rivers

Aphonides Rivers, 1889, p. 6; Casey, 1915, p. 230.
Anoplognatho Rivers, 1889, p. 101.

One species only is known of this genus, and nothing seems to be known of the earlier stages.

Aphonides dunnianus (Rivers)

Anoplognatho dunnianus Rivers, 1889, p. 102; Casey, 1915, pl 229.

An unusual, uncommon, and aberrant species. The very large and externally rounded mandibles, the very high transverse clypeal carina, the very dense and long clypeal margin of hairs, and cribrately punctate mentum (ligula), with its dense and long hairs, readily distinguish the species. The female pygidium is large and transversely tumid at the middle; that of the male is very large and evenly convex. The species is known only from Arizona and Texas but will probably prove to occur in New Mexico and northern Mexico also. The males appear to be quite rare, even more so than the females. Small female *Strategus cessus* may be distinguished from females of this species by their thoracic fovea and square mandibles, and they also have an interrupted basal clypeal carina.

Genus **Euetheola** Bates

Euetheola Bates, 1888, p. 314; Casey, 1915, pp. 178, 186.

Five species of *Euetheola* have been described, of which only two occur in the United States. The genus is close to *Ligyrus*, but the species are more oblong-parallel, the thorax is noticeably longer, and the mandibles when viewed from above are only bidentate. The male front tarsi in *rugiceps* are enlarged but small and simple in *subglabra*.

Euetheola rugiceps (LeConte)

Bothynus rugiceps LeConte, 1856, p. 21; Casey, 1915, p. 187 (*Euetheola*); Baerg and Palm, 1932, p. 207 (biology, also many other references, see Arrow, 1937, p. 36); Ritcher, 1944, p. 24 (larvae).

This sugarcane beetle, or rough-headed cornstalk beetle, is very commonly and widely distributed in the Southeastern States. I have seen specimens from Georgia, Kentucky, and Texas. Phillips and Fox (1924) indicate that vegetable matter in poorly drained, or dark and heavy soils is the main larval habitat, as well as grasslands. The species may also attack corn and cornstalks. The male genitalia are close to those of *Ligyrus gibbosus*, but the parameres are shorter and the lateral teeth are larger and more reflexed.

Euetheola subglabra (Schaeffer)

Ligyrus subglabra Schaeffer, 1909, p. 383; Casey, 1915, p. 188 (*Euetheola*).

Differs from *rugiceps* mainly in the practically impunctate (punctures minute and discernible only under high magnification) thoracic disc, as well as by the second and third alternate elytral intervals having a single row of punctures rather than being confusedly punctate. I have seen a single male from Sinaloa in northern Mexico, collected in July; the species was described from a unique specimen from Nogales, Ariz., but to my knowledge it has not since been taken in the United States. The species is very distinct in the genus.

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ENTOMOLOGY.—*Four new species of mosquitoes from Okinawa (Diptera: Culicidae).*[1] RICHARD M. BOHART, Lieutenant, H(S), U.S.N.R., and ROBERT L. INGRAM, CPhM, U.S.N., U. S. Naval Medical Research Unit No. 2. (Communicated by ALAN STONE.)

During a survey of the northwest coast of Okinawa, Ryukyu Islands, in August and September 1945, four new species of mosquitoes were collected. Type material will be deposited in the U. S. National Museum. All the type localities are in the Hentona District except Shana Wan, which is situated on a bay 4 miles south of the southern limits of the district.

Anopheles (Anopheles) saperoi, n. sp.

Female.—Length 4.5 mm; wing 4.0 mm. Vertex clothed with dark erect scales, some white erect scales medially in front, pale hairlike scales between eyes, remainder of head and its appendages dark, palpus with semi-erect scales, longest toward base where they are almost as long as clypeus. Scutum with sparse brownish hairlike scales, more numerous and whitish anteriorly; scutal integument mostly pale with a distinct unbroken lateral dark margin (Fig. 2); pleuron dark, devoid of scales, with two pale longitudinal stripes visible in some lights. Femora and tibiae dark, latter with an apical ring involving base of tarsi; tarsi with very narrow pale bands covering the joints, indistinct on last two joints of fore- and midlegs. Wing: first humeral spot absent, second humeral spot present but very small, subcostal spot very small, apical spot present, no other costal spots; vein 1 with spots at basal one-fourth, basal one-third and middle (middle spot sometimes absent), as well as apical spot; vein 2 primarily dark, 2.1 with a continuation of apical spot, 2.2 with spot at basal one-third; vein 3 mostly pale except at base and apex; vein 4 primarily dark before fork, 4.1 and 4.2 mostly pale with some dark scales; stem of vein 5 pale with a dark spot before middle, 5.1 mostly pale but dark at base, basal one-third and apex, 5.2 mostly pale on basal three-fourths; vein 6 mostly pale with dark spots at apical two-fifths and at apex; fringe spots absent except one at apex, covering tips of veins 2.1, 2.2 and 3 (Fig. 1). Seventh abdominal sternite with an inconspicuous apical scale tuft.

Male.—Unknown.

Egg.—Length 0.5 mm. Float large, no frill noted. (Figs. 3 and 4 are taken from field sketches made with a dissecting binocular. The eggs were subsequently lost.)

Larva.—Head (Fig. 6): Preclypeal hair 1 slender, curved; inner clypeal hairs long, simple and with bases touching; outer clypeal hair slightly shorter and 4- to 7-branched; posterior clypeal hair nearly as long as outer clypeal hair, simple; frontal and occipital hairs as shown in figure 6; terminal antennal hair 4-branched and extending slightly beyond dorsal saber; antennal hair inserted at basal one-third of shaft, 3- to 4-branched, usually not extending beyond middle of shaft. Antenna spiculate, particularly along inner surface. Thorax (Fig. 5): Prothoracic hair 1 with 3–6 branches; hair 2 with about 8 branches, relatively slender; hair 3 short and simple; metathoracic palmate hair with many well developed branches. Abdomen: Palmate hairs weak on tergite I, well developed with about 20 leaflets on II to VII, the leaflets somewhat slender on II, leaflets sparsely notched and shaped as in Fig. 7; lateral hair of segments I and II stout and many-branched, that of III similar but weaker, that of IV and V slender and bifid near base, that of VI simple; anterior tergal plates small, with concave posterior border, pecten with 8–9 long and 10–11 short teeth (Fig. 8).

Type.—Female, Chizuka, Okinawa, August 24, 1945, collected biting (R. Bohart and R. Ingram collectors).

Paratypes.—Five females, same data as type but collected between August 25 and 31. One female paratype, Euka, August 27, 1945, collected biting (R. Ingram collector). An additional specimen from Chizuka was collected on September 8 and laid eggs in the laboratory. Three larval paratypes were reared to the fourth instar.

Remarks.—This species is related to *barbirostris* van der Wulp, *gateri* Baisas, and

[1] Received November 29, 1945.

umbrosus Theobald. In common with these species it has only two definite spots on the costa, narrow tarsal bands, unbanded hind femur and entirely dark palpus. The adult differs from the other three species in having more prominent hind tarsal bands which cover the joints. Also, it differs from *gateri* in having pale interruptions on the basal one-third of vein 1; from *barbirostris* in having a slightly different wing pattern including an all dark posterior fringe, a continuous dark lateral scutal margin and no conspicuous scale tuft on the seventh sternite; and from *umbrosus* in the larger apical fringe spot and the entirely dark scaled stems of veins 2 and 4. The larva is distinctive in having a very short antennal tuft, a sparsely branched outer clypeal hair and a long single hair 4. It further differs from *gateri* and *umbrosus* by its well developed palmate hairs on the abdomen.

This species is named for Capt. J. J. Sapero (MC), U.S.N., in recognition of his contributions to malariology and his personal encouragement.

Uranotaenia stonei, n. sp.

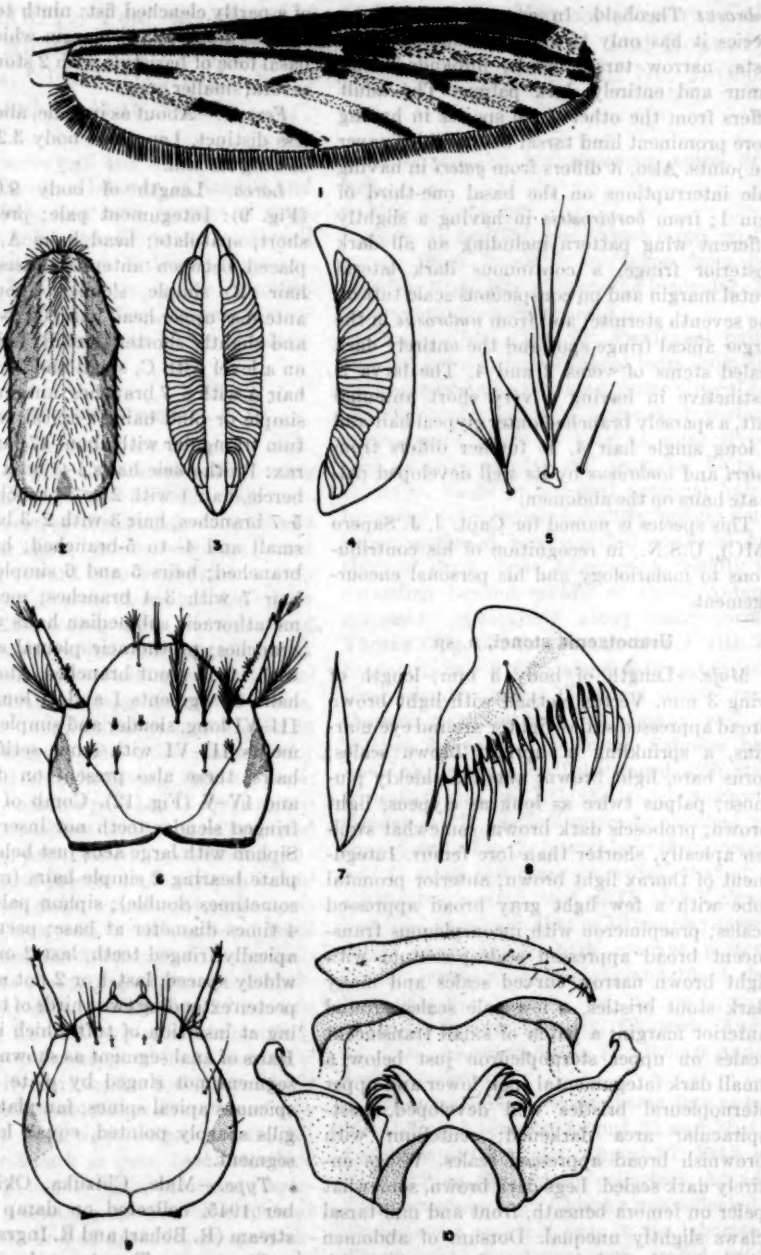
Male.—Length of body 3 mm; length of wing 3 mm. Vertex clothed with light brown broad appressed scales, lighter around eye margins, a sprinkling of upright brown scales; torus bare, light brown; antenna thickly plumose; palpus twice as long as clypeus, light brown; proboscis dark brown, somewhat swollen apically, shorter than fore femur. Integument of thorax light brown; anterior pronotal lobe with a few light gray broad appressed scales; proepimeron with inconspicuous translucent broad appressed scales; scutum with light brown narrow curved scales and many dark stout bristles, a few pale scales around anterior margin; a patch of small translucent scales on upper sternopleuron just below a small dark integumental spot, lower and upper sternopleural bristles well developed, postspiracular area darkened; scutellum with brownish broad appressed scales. Wings entirely dark scaled. Legs dark brown, somewhat paler on femora beneath, front and mid tarsal claws slightly unequal. Dorsum of abdomen clothed with dark brown scales, tergites with inconspicuous pale basal bands on II–VII, venter pale. Genitalia (Fig. 10): Lateral plate of mesosome with five prongs in the position of a partly clenched fist; ninth tergite without bristles along apical margin which is concave; basal lobe of basistyle with 2 stout bristles and several smaller ones.

Female.—About as in male, abdominal bands less distinct. Length of body 3.25 mm; length of wing 3.5 mm.

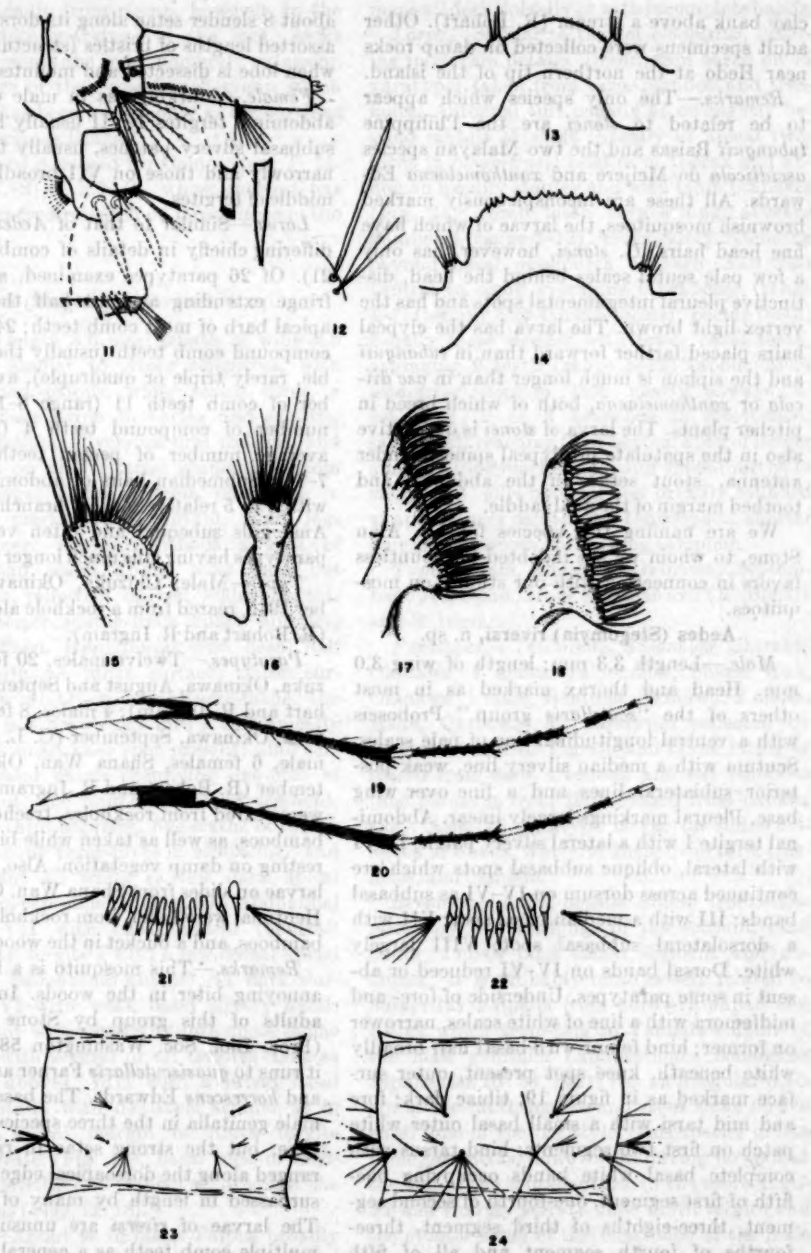
Larva.—Length of body 9.0 mm. Head (Fig. 9): Integument pale; preclypeal spines short, spatulate; head hairs A, B, C, and d placed between antennal bases; lower head hair (B) simple, slender, about as long as antenna; upper head hair (C) 2- to 4-branched and slightly shorter than B; hair d inside and on a level with C, small and 2- to 4-branched; hair A with 5–7 branches; antenna slender with simple or bifid hair at apical two-fifths; mentum triangular with about 17 large teeth. Thorax: Prothoracic hairs 1–3 on a sclerotized tubercle, hair 1 with 2 or 3 branches, hair 2 with 5–7 branches, hair 3 with 2–3 branches; hair 0 small and 4- to 5-branched; hair 4 about 8-branched; hairs 5 and 6 simple, 5 very long; hair 7 with 3–4 branches; mesothoracic and metathoracic submedian hairs with 4 setiform branches; prothoracic pleural submedian hair with 11–14 stout branches. Abdomen: Lateral hairs of segments I and II long and stout, of III–VI long, slender and simple or double; segments III–VI with stout setiform sublateral hairs, these also present on dorsum of I–II and IV–V (Fig. 12). Comb of 15–20 apically fringed slender teeth not inserted on a plate. Siphon with large acus just below a sclerotized plate bearing 2 simple hairs (more dorsal hair sometimes double); siphon pale brown, about 4 times diameter at base; pecten of about 20 apically fringed teeth, last 2 or 3 larger, more widely spaced, last 1 or 2 not apically fringed; pecten extending two-thirds of tube length, ending at insertion of tuft which is 6-7 branched. Hairs of anal segment as shown in Fig. 11; anal segment not ringed by plate which has conspicuous apical spines; fan plate with 10 hairs; gills sharply pointed, equal, longer than anal segment.

Type.—Male, Chizuka, Okinawa, September 1945, collected on damp rocks above a stream (R. Bohart and R. Ingram).

Paratypes.—Twenty males and 19 females (same data as type) and 15 larvae on slides (same locality and date as type) siphoned from a deep hole of narrow diameter in the rocky



FIGS. 1–8.—*Anopheles saperoi:* 1, wing; 2, scutum; 3, dorsal view of egg; 4, lateral view of egg; 5, right prothoracic submedian hairs; 6, dorsal view of larval head; 7, enlargement of leaflets from palmate hair on fifth abdominal segment; 8, pecten. FIGS. 9–10.—*Uranotaenia stonei:* 9, dorsal view of larval head; 10, male genitalia: mesosome and associated structures, margin of ninth tergite, and dististyle.



FIGS. 11, 12.—*Uranotaenia stonei:* 11, larval siphon and anal segment, including enlargements of a comb tooth, pecten teeth, and apical margin of saddle; 12, lateral spine and hair of third abdominal segment. FIG. 13.—*Aedes riversi*, ninth male tergite. FIG. 14.—*Aedes downsi*, ninth male tergite. FIGS. 15, 16.—*Aedes riversi:* 15, lateral view of apex of basal lobe of basistyle; 16, ventral view of basal lobe of basistyle. FIGS. 17, 18.—*Aedes downsi:* 17, ventral view of basal lobe of basistyle; 18, dorsal view of basal lobe of basistyle. FIG. 19.—*Aedes riversi*, outer lateral view of hind leg. FIG. 20.—*Aedes downsi*, outer lateral view of hind leg. FIG. 21.—*Aedes riversi*, larval comb. FIG. 22.—*Aedes downsi*, larval comb. FIG. 23.—*Aedes riversi*, second abdominal tergite of larva. FIG. 24.—*Aedes downsi*, second abdominal tergite of larva.

clay bank above a stream (R. Bohart). Other adult specimens were collected on damp rocks near Hedo at the northern tip of the island.

Remarks.—The only species which appear to be related to *stonei* are the Philippine *tubanguii* Baisas and the two Malayan species *ascidiicola* de Meijere and *xanthomelaena* Edwards. All these are inconspicuously marked brownish mosquitoes, the larvae of which have fine head hairs. *U. stonei*, however, has only a few pale scutal scales behind the head, distinctive pleural integumental spots and has the vertex light brown. The larva has the clypeal hairs placed farther forward than in *tubanguii* and the siphon is much longer than in *ascidiicola* or *xanthomelaena*, both of which breed in pitcher plants. The larva of *stonei* is distinctive also in the spatulate preclypeal spines, slender antenna, stout setae on the abdomen and toothed margin of the anal saddle.

We are naming this species for Dr. Alan Stone, to whom we are indebted for countless favors in connection with our studies on mosquitoes.

Aedes (Stegomyia) riversi, n. sp.

Male.—Length 3.3 mm; length of wing 3.0 mm. Head and thorax marked as in most others of the "*scutellaris* group." Proboscis with a ventral longitudinal line of pale scales. Scutum with a median silvery line, weak posterior sublateral lines and a line over wing base. Pleural markings largely linear. Abdominal tergite I with a lateral silvery patch; II–VI with lateral, oblique subbasal spots which are continued across dorsum on IV–VI as subbasal bands; III with a median basal spot; VII with a dorsolateral subbasal spot; VIII largely white. Dorsal bands on IV–VI reduced or absent in some paratypes. Underside of fore- and midfemora with a line of white scales, narrower on former; hind femur with basal half broadly white beneath, knee spot present, outer surface marked as in figure 19; tibiae dark; fore and mid tarsi with a small basal outer white patch on first two segments; hind tarsus with complete basal white bands occupying one-fifth of first segment, one-fourth of second segment, three-eighths of third segment, three-fourths of fourth segment and all of fifth segment. Genitalia (Figs. 13, 15, 16) with slender dististyle, ninth tergite strongly convex apically; and basal lobe of basistyle bearing about 8 slender setae along its dorsal edge and assorted lengths of bristles (structure best seen when lobe is dissected and mounted laterally).

Female.—Markings as in male except that abdominal tergites I–VII usually have lateral subbasal silvery patches, usually those on VI narrowly and those on VII broadly joined at middle of tergites.

Larva.—Similar to that of *Aedes albopictus*, differing chiefly in details of comb teeth (Fig. 21). Of 26 paratypes examined, all have the fringe extending at least half the length of apical barb of most comb teeth; 24 have some compound comb teeth (usually these are double, rarely triple or quadruple), average number of comb teeth 11 (range 8–14), average number of compound teeth 4 (range 0–9); average number of pecten teeth 11 (range 7–16). Submedian hairs of abdominal tergites with 3 to 5 relatively short branches (Fig. 23). Anal gills subequal and often very long, 14 paratypes having gills much longer than siphon.

Type.—Male, Chizuka, Okinawa, September 1945, reared from a rockhole along a stream (R. Bohart and R. Ingram).

Paratypes.—Twelve males, 20 females, Chizuka, Okinawa, August and September (R. Bohart and R. Ingram); 4 males, 8 females, Hentona, Okinawa, September (C. L. Harnage); 1 male, 6 females, Shana Wan, Okinawa, September (R. Bohart and R. Ingram). Paratypes were reared from rockholes, treeholes, and cut bamboos, as well as taken while biting or while resting on damp vegetation. Also, 24 paratype larvae on slides from Shana Wan, Chizuka, and Hentona, were taken from rockholes, treeholes, bamboos, and a bucket in the woods.

Remarks.—This mosquito is a frequent and annoying biter in the woods. In the key to adults of this group by Stone and Farner (Proc. Biol. Soc. Washington **58**: 159. 1945) it runs to *quasiscutellaris* Farner and R. Bohart and *horrescens* Edwards. The basal lobe of the male genitalia in the three species is similar in type, but the strong setae in *riversi* are arranged along the dorsoapical edge and they are surpassed in length by many of the bristles. The larvae of *riversi* are unusual in having multiple comb teeth as a general rule, a character previously known only in *marshallensis* Stone and R. Bohart from the Marshall Islands and the Gilbert Islands. The latter species

differs decidedly from *riversi*, however, in the reduced white markings of the legs. *Aedes riversi* represents the most northerly extension of the range of the "*scutellaris*" group which heretofore has been known only as far north as Saipan, Marianas Islands.

The species is named for Commodore T. M. Rivers, MC(S), U.S.N.R., whose interest has greatly furthered research on mosquitoes in the Pacific area.

Aedes (Stegomyia) downsi, n. sp.

Male.—Length 3.0 mm; length of wing 2.5 mm. Very similar to *Aedes albopictus*, with white banded palpus, white scaled torus, a silvery median stripe on vertex and scutum, silvery scutellum, silvery pleural patches, and basal spots on first 2 tarsal segments of fore and mid legs. Differing from *albopictus* in details of markings of scutum, hind legs and abdomen. Scutum without a spot of silvery broad scales above wing base but with a few yellowish curved scales at this point, posterior scutal lines duller and less sharply defined. Hind femur with basal half mostly white on inner surface, outer surface mostly white on basal three-fifths, the white area not drawn out into a line apically (Fig. 20); a small knee spot present; hind tarsus with basal bands occupying one-fifth of first segment, one fourth of second segment, one-half of third segment, five-sixths of fourth segment (about three-fifths in *albopictus*), and fifth segment all white (a few dark apical scales in some specimens) (Fig. 20). Abdominal tergites I–VII with basal lateral (ventral) silvery spots, tergite I with a few dorsal apical pale scales (sometimes absent), II dark dorsally, III–VI with weak basal silvery bands which do not widen laterally into spots (some paratypes with several or all tergites dark as seen from above), VIII with a broad basal band. Genitalia with dististyle slender as in *albopictus;* apical margin of ninth tergite sharply serrate (Fig. 14), basal lobe of basistyle with bristles and leaflets all of about the same lengths (Figs. 17, 18).

Female.—About as in male. Palpus broadly white-tipped, abdominal tergites with basal bands on II–V, a broad basal spot at middle of VI and a small basal spot on VII. Some specimens all dark dorsally or with incomplete bands.

Larva.—Similar to that of *albopictus*, differing in certain details. Description based on 18 paratypes taken from taro, bamboo and treeholes: Antennal tuft usually at or slightly beyond middle of shaft (usually at apical two-fifths in *albopictus*); bristles of thorax and abdomen usually stouter and with more branches (Fig. 24); comb teeth very strong, average number 9 (range 6–12), fringe rarely extending beyond basal one-fourth of barb; hair just ventral to comb averaging 6 branches (range 4–7) (usually 3 or 4 in *albopictus*); pecten teeth; usually more slender with fewer basal teeth, averaging 9 teeth (range 6–12) (about 13 in *albopictus*); siphon tuft nearly always 4-branched (2 or 3 branches in *albopictus*); saddle hair reaching to or beyond apex of longer anal gill (not reaching beyond three-fourths in *albopictus*); gills unequal and broadly rounded at apex, longer pair shorter than siphon, shorter pair usually about half as long as siphon.

Type.—Male, Chizuka, Okinawa, September 1945, reared from taro leaf axil (R. Bohart and R. Ingram).

Paratypes.—Ten males, 8 females, Chizuka, Okinawa; 7 males, 14 females, Shana Wan, Okinawa; 1 male, Hentona, Okinawa; 2 males, Hedo, Okinawa; all paratypes collected by R. Bohart and R. Ingram and taken biting or reared from taro, treeholes and cut bamboos (one paratype from Hedo reared from banana axil). Also, 16 paratype larvae on slides collected at Shana Wan and Hedo from taro, treeholes, and bamboo.

Remarks.—*Aedes downsi* differs from *albopictus* by the markings of the scutum, hind femur, fourth hind tarsal segment and abdomen. It is probably most closely related to *flavopictus* Yamada from northern Japan and Korea which according to Yamada's figure of the male genitalia (Annotationes Zoologicae Japanenses 10: 53. 1921) has an irregular margin of the ninth tergite and stout setae on the basal lobe of the basistyle. This species differs from *flavopictus*, however, in having no spot at the end of the scutal suture, in the more angular and sharply serrate male ninth tergite and the stouter setae of the basal lobe of the male dististyle. Yamada's original description does not mention the markings of the legs and abdomen of *flavopictus* except to indicate that

they resemble those of *albopictus*. It should be noted that Barraud's figures of *flavopictus* (Fauna of British India 5 (Culicidae): 236. 1934) do not coincide with those of Yamada.

The species is named for Maj. W. G. Downs, MC, AUS, acting island epidemiologist on Okinawa, in appreciation of his contribution of specimens and other services.

ENTOMOLOGY.—*The genera of beetles of the family Bruchidae in America north of Mexico.*[1] J. C. BRIDWELL. (Communicated by W. L. SCHMITT.)

The first species of Bruchidae from our area was described in the printed inaugural dissertation, or graduation thesis, of Michael A. Baeckner presented to the faculty of Upsala under the presidency of Linnaeus and defended on December 18, 1752. In this dissertation, *Noxa insectorum*, the pea Bruchus and the oriental species now known as *Callosobruchus chinensis* were described in the new genus *Bruchus*, there used for the first time as a generic name in zoology. They are the first species of Bruchidae described.

Names prior to 1758 are not available, and it is our great misfortune that, in his tenth edition, Linnaeus did not adopt the name *Bruchus* as he later did but treated the pea weevil in his genus *Dermestes*, and that his citation of the name *Bruchus americae septentrionalis* as published by Peter Kalm, 1756, has been ruled as offering no availability of the name *Bruchus*. In Opinion 5 of the International Commission of Zoological Nomenclature names prior to 1758 which are cited in synonymy in 1758 or later are not thereby made available for use. The writer hopes that an arbitrary ruling by the Commission may make an exception in this particular case so as to avoid the great confusion resulting from long use of the homonym *Mylabris* Fabricius, 1775, for the very large group of blister beetles and the relatively recent readoption of *Mylabris* Geoffroy, 1762, for the seed weevils. Such a ruling offers the only solution to the problems arising from the same generic name having been extensively used for more than a thousand species nearly equally applied to small weevils and to large blister beetles, but the problems are even more involved. Unless *Bruchus* can be validated as of 1758, this same name as applied by Geoffroy, 1762, is to be adopted for the genus we have known under the subsequent name *Ptinus*. This would increase the number of specific names involved by more than 300. The substitution of *Mylabris* for *Bruchus* and of *Bruchus* for *Ptinus*, as proposed about 75 years ago to conform with the law of priority, has not become effective. The above suggestion to invoke the plenary power to suspend the rules and arbitrarily validate *Bruchus* Linnaeus as of 1758 appears to be the only solution. Its effect would be to maintain *Bruchus* and *Ptinus* as they have long been commonly used and to eliminate *Mylabris* from use even for the meloid genus. The older entomologists knew and disregarded the basis of this confusion.

To the pea Bruchus, which we now know to have been introduced into America, other members of the family have since been added so that now nearly 90 species of described bruchids are known to be native to our area or have become established in it by the operations of commerce. Besides these named species about half as many unnamed species have been recognized in collections by L. J. Bottimer or myself. Before undertaking to describe the novelties it has seemed desirable for the writer to distinguish the groups which he has come to recognize during more than 25 years' study of Bruchidae. The present paper is intended to make known the groups of Bruchidae in America, north of Mexico, whether native or introduced, which he believes should be considered genera.

The most recent revision of the Bruchidae of the entire world was published by Schoenherr in 1839, and there has been but little advance in the broader classification of these insects since that time. The arrangement of the species found in the United States and Canada as listed in the Leng Catalogue is based upon the revision of our species by Horn 1873 but *Mylabris*

[1] Received December 11, 1945.

Geoffroy is substituted for *Bruchus* Linnaeus. Twenty-nine valid and available generic names with their genotypes were arranged in five subfamilies by the writer in 1932 (Proc. Ent. Soc. Washington **34**: 100–106). Two additional generic names, *Sulcobruchus* Chujo, 1937, and *Specularius* Bridwell, 1938, have since become available, but these 31 genera are inadequate for the various forms now known in this family. Ten of these named genera occur in our area.

Two of the five subfamilies recognized by the writer in 1932 consist of single genera. The Eubaptinae consist of a single South American species. The Kytorhininae include only the genus *Kytorhinus*. The Pachymerinae were treated by the writer in 1929 (Proc. Ent. Soc. Washington **31**: 141–160) and the genera of Amblycerinae are herein distinguished.

The fifth subfamily, Bruchinae, includes more genera and species than all the others together, but the genera are not easily arranged into groups. *Bruchus* in the Old World and *Megacerus* in America are so different from the other genera as to warrant the erection for them of the monobasic tribes Bruchini and Megacerini. The Old World genera, of which *Bruchidius* is the center, seem to be of common descent separately from the American genera centering in *Acanthoscelides*. It seems advisable to assemble *Bruchidius* Schilsky, *Bruchinus* Schilsky, *Callosobruchus* Pic, *Specularius* Bridwell, 1938 (genotype, *Specularius erythrinae* Bridwell, 1938 =*Bruchus impressithorax* Pic, 1932), and *Sulcobruchus* Chujo into a tribe Bruchidiini. *Caryedes* Hummel, *Impressobruchus* Pic, *Pygiopachymerus* Pic, *Falsobruchus* Pic, *Gibbobruchus* Pic, *Phelomerus* Pic, *Cosmobruchus* Bridwell, *Dahlibruchus* Bridwell, and *Rhipibruchus* Bridwell may be included with *Acanthoscelides* in a tribe Acanthoscelidini. It is premature to attempt a diagnosis of Bruchidini or Acanthoscelidini. Both tribes have the prothorax conical or sometimes campanulate. An impressed line parallel to the lateral margin of the pronotum, such as is found in the Pachymerinae, is more often found in the Acanthoscelidini. In the latter the hind femur usually bears an armature of teeth and denticles, and the hind tibia is armed at apex with a mucro and a lateral apical tooth with two to five subdorsal apical denticles. Aedeagal distinctions between these two tribes also exist. Accepting for the present a tribe Acanthoscelidini for the American Bruchinae, with conical pronotum, we find two series extremely unlike if extremes be taken, but the intergradent forms cannot be very easily separated. The key here given is designed to establish new genera and to distinguish all the genera native to or accidentally established in America north of Mexico. All of them are believed to be natural groups.

KEY TO THE GENERA OF BRUCHIDAE IN THE UNITED STATES AND CANADA

1. Dorsum of prothorax without a surrounding impressed marginal line.....2
   Dorsum of prothorax with a surrounding impressed marginal line; hind femur ovate, much broader than the coxa, unicarinate beneath with a subapical great tooth and beyond it a crista bearing about 10 denticles (Pachymerinae)..... *Caryobruchus* Bridwell, 1929, *C. gleditsiae* (Linnaeus, 1763)
2. Hind tibia with two movable spurs or calcaria; hind coxa twice as broad as the femur (Amblycerinae).....3
   Hind tibia with fixed spines or teeth at apex or unarmed; hind coxa not twice as broad as the femur.....4
3. Eyes very feebly emarginate, elytra elongate, tenth stria reaching nearly to apex; prosternal process separating the coxae to apex; calcaria unequal, the longer more than half as long as first tarsal joint..... .....*Amblycerus* Thunberg, 1815
   Eyes strongly emarginate, elytra subquadrate; tenth stria abbreviate, only half as long as elytron; front coxae not separated by the prosternal process; calcaria shorter, subequal.....*Zabrotes* Horn, 1885
4. Only the pygidium fully sclerotized and exposed behind the elytra; mesepimeron strongly narrowed basally not reaching the coxal cavity (Bruchinae).....5
   Pygidium and preceding tergite fully sclerotized and exposed behind the elytra; mesepimeron not strongly narrowed basally reaching the coxal cavity; antennae serrate in female, flabellate in male (Kytorhininae); Alaska, Alberta. *Kytorhinus* Fischer von Waldheim, 1809, *K. prolixus* (Fall, 1926).
5. Prothorax without a median tooth on lateral margin, front carinate or with a glabrous line or area; male without specialized spine, teeth or lamella at apex of middle tibia..6

Prothorax emarginate on the lateral margin with a single tooth near middle before the emargination; front without a carina or glabrous line; male with specialized spines or processes at apex of middle tibia; hind femur with outer lower margin more prominent armed near apex with a strong acute tooth..... *Bruchus* Linnaeus, 1767 (1758?) (Schilsky restr.)

6. Tenth stria of elytron not abbreviated; antennae never flabellate.....7
Tenth stria not extending beyond the epipleural lobe; front carinate; antennae serrate in females, flabellate in males; pronotum conical with sides straight or concave, flanks separated from dorsum by a carina and impressed line; elytra depressed along the suture, the intervals of varying width, striae 4 and 5 abbreviated at apex, hind femur but little incrassate, ventral margin flattened with both edges carinate, inner carina simple or with a small obtuse subapical tooth or crenate or serrulate for its entire length; pygidium flat, elongate, vertical (Megacerini)..... *Megacerus* Fahraeus, 1839

7. Hind femur not dentate on both inner and outer edges beneath near apex, if emarginate and subdentate on outer edge then dorsum and flank of prothorax separated by a distinct arcuate lateral carina (Acanthoscelidini and *Sparteus*, Bruchidiini)..8
Hind femur with outer and inner edges armed near apex beneath with a single strong tooth continued toward base by longitudinal carinae; pronotum conical with convex sides, lateral carina obsolete; pygidium vertical or subvertical; antennae unlike in the sexes, subserrate in females, somewhat longer in males, or strongly serrate, or subpectinate. (Bruchidiini)..... *Caliosobruchus* Pic, 1902

8. Antennae not extraordinarily long.....9
Antennae of male longer than the body, reaching beyond the hind coxa in female; striae 2–4 arising from a bituberculate elevation at base of elytra; hind femur not as broad as coxa, armed beneath near apex with three similar denticles; hind tibia armed with a long slender mucro half as long as the tibia; pygidium elongate, oblique in female, more convex and vertical in male; hind femur not reaching apex of abdomen in female, extending beyond it in male....*Stylantheus*, n. gen.; genotype *S. macrocerus* (Horn) (*Bruchus macrocerus* Horn, 1873)

9. Hind femur with a strong tooth or spine near apex, beneath, within, and beyond this one or more denticles.....10
Hind femur unarmed or with a single tooth or spine without denticles.....15

10. Hind femur strongly incrassate, broader than its coxa, channeled beneath, outer edge of ventral margin crenate or serrulate; pygidium of female with a rounded mirror-like area..... *Gibbobruchus* Pic, 1913, *G. mimus* (Say, 1831)
Hind femur with the outer ventral margin not crenate or serrulate.....11

11. Fourth stria of elytron abbreviate at base starting from a small tubercle; hind femur with inner edge beneath serrulate with a strong tooth beyond the serrulations and after a space with about four denticles.. *Meibomeus* n. gen.; genotype *M. musculus* (Say) (*Bruchus musculus* Say, 1831)
Fourth stria not abbreviate at base; femoral denticles approximate to the tooth.....12

12. Hind femur broader than the coxa, subsulcate beneath armed beneath within near apex with a strong tooth and 3 or 4 denticles; scutellum transverse; some of the striae arising from basal dentiform elevations; last sternite emarginate in both sexes.... *Merobruchus*, n. gen.; genotype *M. julianus* (Horn) (*Bruchus julianus* Horn, 1894)
Hind femur not broader than coxa, only 1 or 2 denticles, or if more than 2 denticles the elytron without basal dentiform elevations 13

13. Abdomen elongate, the femur not reaching apex of abdomen; pygidium subhorizontal, elongate, bent down at apex in male; elytra with basal dentiform elevations..14
Abdomen less elongate, oblique or subvertical ..... *Acanthoscelides* Schilsky, 1905

14. Scutellum transverse; mucro short; front with glabrous area expanded toward vertex; hind femur profoundly channeled beneath in male..*Mimosestes*, n. gen.; genotype *M. sallaei* (Sharp) (*Bruchus sallaei* Sharp, 1885)
Scutellum twice as long as broad; mucro elongate, frontal glabrous line not expanded toward vertex; hind femur alike in the sexes not profoundly channeled beneath.. *Algarobius*, n. gen.; genotype *A. prosopis* (LeConte)[1] (*Bruchus prosopis* LeConte, 1858)

15. Sides of pronotum convex, surface of dorsum even; depth of body less than width....16
Sides of pronotum concave, dorsum uneven; front strongly carinate; depth of body about as great as width; elytral striae 5 and 6 abbreviated at apex; pygidium elongate, convex, oblique..*Neltumius*, n. gen.; genotype *N. arizonensis* (Schaeffer) (*Bruchus arizonensis* Schaeffer, 1904)

16. Pronotum with flanks separated from dorsum by a lateral carina ending near coxal cavity.....17

[1] This species includes also *Bruchus uniformis* and *desertorum* LeConte 1858.

Pronotum with flanks not separated by a carina, the lateral carina vestigial or wanting.....18

17. Lateral carina of pronotum simple, in an even curve, not denticulate; pygidium unlike in the sexes; hind femur alike in the sexes, flattened beneath, both edges carinate, the outer more prominent, emarginate before the apical lamella, the inner with a strong suberect tooth near apex; front with a glabrous line not expanded above, or subcarinate; antennae alike in the sexes, not serrate; hind tibia with mucro much longer than lateral apical tooth..... *Stator*, n. gen.; genotype *S. pruininus* (Horn) (*Bruchus pruininus* Horn, 1873)

Lateral carina abruptly bent downward to the coxa with a few denticulations before the middle; pygidium alike in the sexes; hind femur with inner edge carinate, emarginate near apex and produced into a broad flat tooth before the emargination, with a deep pubescent sulcus at base in male; front with a glabrous area expanded above to vertex; antennae serrate, larger in male; hind tibia with lateral apical tooth longer than the mucro..*Cercidiestes*, n. gen.; genotype *C. ulkei* (Horn) (*Bruchus ulkei* Horn, 1873)

18. Hind femur beneath near apex with a distinct tooth or spine.....19

Hind femur unarmed beneath or at most with a minute denticle.....20

19. Hind femur beneath not at all carinate on either margin, inner margin with a strong obliquely truncate spine often tridenticulate on the truncation..*Althaeus*, n. gen.; genotype *A. hibisci* (Olivier) (*Bruchus hibisci* Olivier, 1795)

Hind femur beneath with inner margin carinate, the carina extending nearly to base, microserrulate before the simple spine *Sennius*, n. gen.; genotype *S. cruentatus* (Horn) (*Bruchus cruentatus* Horn, 1873)

20. Elytra with striae 4 and 5 abbreviate at apex; inner margin of hind femur beneath carinate with an apical emargination and a minute denticle or angulation before it... *Sparteus*, n. gen.; genotype *S. villosus* (Fabricius) (*Bruchus villosus* Fabricius, 1792)

Elytra with striae 5 and 6 abbreviate at apex, hind femora entirely without carinae or denticles beneath..*Abutiloneus idoneus*, n. gen. and new sp. (*Bruchus flavicornis* Schaeffer, 1907, and perhaps Sharp, 1885; not *Bruchus flavicornis* Fabricius, 1792)

Abutiloneus idoneus is a small species 1.6 to 1.8 mm long by 1.0 to 1.1 mm wide, densely clothed with pale yellowish to silvery pubescence almost concealing the black integument, the antennae and legs uniformly clear lemon-yellow. Several lots of specimens with the following data have been examined: San Diego, Tex., E. A. Schwarz, May 4–7, probably 1879, 9 specimens; Corpus Christi, Tex., F. C. Pratt, April 12, 1906, one specimen; Brownsville, Tex., L. J. Bottimer, one specimen extracted from a seed of *Abutilon berlandieri* collected by H. C. Hanson, probably in 1919; Brownsville, Tex., reared by the writer in 1921 from Abutilon, 37 specimens: Guerrero, Coahuila, L. J. Bottimer, December 30, 1924, to February 15, 1925, reared from seeds to *Abutilon berlandieri*, collected December 9, 1924, 19 specimens; Brownsville, Tex., Bibby and Higdon, December 12, 1939, from *Abutilon berlandieri*, 6 specimens; Brownsville, Tex., I. Shiller, April 1941, with seeds of *Abutilon lignosum*, 33 specimens; Reynosa, Mexico, through A. J. Chapman, April 3–11, 1941, *Abutilon lignosum*, 12 specimens.

Type locality.—Brownsville, Tex.

Type and 97 paratypes.—U.S.N.M. no. 57766. Twenty paratypes in collection of L. J. Bottimer.

Excluded Genera

North American Bruchidae have been placed in 19 genera; 10 of these genonyms are believed not applicable to any of our species, for reasons indicated with each name.

(1) *Curculio* Linnaeus, 1758, genotype *B. nucum* Linnaeus, designated by Latreille, 1810. Type genus of Curculionidae.

(2) *Dermestes* Linnaeus, 1758, genotype *D. lardarius* Linnaeus, designated by Latreille, 1810. Type genus of Dermestidae.

(3) *Mylabris* Geoffroy, 1762, genotype *Bruchus pisi* Linnaeus, 1767, designated by Bridwell, 1932. I have considered this a synonym of *Bruchus* Linnaeus, 1758. See introductory discussion of *Bruchus*.

(4) *Laria* Scopoli, 1763, genotype *Laria dulcamarae* Scopoli, designated by Bridwell, 1932, accepted by Barber, 1942 (U. S. Dept. Agr. Misc. Bull. 468, p. 9) (*Pria* Stephens, 1829, genotype *Pria truncatella* Marsham, 1802, monobasic. Isogenotypic with *Laria* by synonomy, *Laria dulcamarae* = *Pria truncatella*). This species also appears to be the unnamed type

upon which *Byturus* Latreille, 1796, was erected, but not one of the forms to which the name is now attached. Hence *Laria* is a genus of Nitidulidae.

(5) *Pachymerus* Thunberg, 1805, genotype *Pachymerus bactris* = *Dermestes bactris* Linnaeus, 1763, monobasic.

(6) *Caryoborus* Schoenherr, 1833, genotype *Bruchus* (*Caryoborus*) *serripes* = *Bruchus serripes* Sturm, 1826, by original designation. This and the preceding are distinct tropical American genera without species in our area. *Dermestes gleditsiae* Linnaeus, 1763 = *Bruchus arthriticus* Fabricius, 1801, referred to *Caryoborus* by Schoenherr, 1833 and to *Pachymerus* by Pic, 1913, is the genotype of *Caryobruchus* Bridwell, 1929. *Caryedon fuscus*, of which *Caryoborus gonagra* (Fabricius) is a synonym, is a polyphagous species widely distributed in the Old World tropics. In West Africa a species of *Caryedon* is reported under other names as seriously injurious to the peanut (*Arachis hypogaea*) but is in all probability this species. *Caryedon fuscus* has in late years become established in Jamaica, Hispaniola, and Dutch Guiana and may be expected to become established in the United States.

(7) *Pseudopachymerus* Pic, 1913, genotype *Pseudopachymerus brasiliensis* (Thunberg) = *Bruchus brasiliensis* Thunberg, 1816. Failing to trace *Pachymerus* to its source and to find its true genotype, Schoenherr, 1833, designated *Bruchus brasiliensis* Thunberg, 1816, as genotype of *Pachymerus*. This species is congeneric with *Bruchus faldermanni* Mannerheim, 1827, genotype of *Caryedes* Hummel, 1827, a tropical American genus without species in our area. *Pedapholus* Gistl, 1848, Naturg. Thierreichs X (new synonymy), *Adrómisus* De Gozis, 1881, and *Pseudopachymerus* Pic, 1913, substitute names for *Pachymerus* Schoenherr not Thunberg having *Bruchus brasiliensis* Thunberg for genotype are synonyms of *Caryedes*. *Bruchus* (*Pachymerus*) *crataegi* Fahraeus, 1839, is a synonym of *Bruchus mimus* Say, which has now been referred to *Gibbobruchus* Pic, 1913. Sharp, 1885, Schilsky, 1905, and others have extended Schoenherr's misapplication of *Pachymerus* to include some species of *Callosobruchus* Pic. These have only a slight resemblance in body form of Schoenherr's pseudotype and have only family characters in common with the true *Pachymerus* as typified by *bactris*.

(8) *Spermophagus* Schoenherr, 1833, genotype *Spermophagus titivilitius* Boheman, 1833, by original designation. The species originally included in *Spermophagus* are referable to three well defined genera; *Amblycerus* Thunberg, 1815, *Spermophagus* restricted, and *Zabrotes* Horn, 1885. Zacher, 1930, divided the genus into three genera, *Spermophagus*, *Zabrotes*, and *Euspermophagus*, the last proposed as new. The group to which he misapplied the name *Spermophagus* is *Amblycerus*, genotype *Bruchus robiniae* Fabricius, 1781. The type of *Spermophagus*, *S. titivilitius*, is, from the description, not congeneric with *robiniae* but with the genotype of *Euspermophagus*, which must therefore be suppressed as a synonym of *Spermophagus* if my conclusions are correct. *Spermophagus titivilitius* was described as from Mexico but the available evidence leads me to believe this an error and that the species is native to the Old World. The same conclusion has been reached for *S. rufiventris* Boheman described at the same time from the Crimea and from Brazil and compared with *titivilitius*. Both species were described as having the abdomen red which is common in *Spermophagus* while in *Zabrotes* the abdomen is always black. Hence *Spermophagus* appears to be the proper name for all Old World Amblycerinae excepting, perhaps, *Pygospermophagus brevicornis* Pic, 1917. This name is based upon a single male which may be a *Spermophagus* with exaggerated secondary sexual characters; the female, when discovered, may be a normal *Spermophagus*. *Spermophagus* has not been described sufficiently to distinguish it from *Zabrotes* which it resembles in its short, compact form, with the pygidium and last visible sternite unlike in the sexes and with the lateral carina of the pronotum complete; in both genera the eyes are deeply emarginate, the ventral surface of the hind tibia is

flattened and definitely limited outwardly by a carina or a row of bristles; the scutellum is a small simple triangle; the short elytra barely cover the base of the pygidium; the calcaria of the hind tibia are short and subequal. From *Zabrotes*, *Spermophagus* differs in these four ways:

A. The tenth elytral stria is complete reaching both base and apex while in *Zabrotes* this stria is abbreviate at apex, not extending beyond the middle of the elytron.

B. In *Spermophagus* the flanks of the pronotum below the lateral carina are produced anteriorly into a vertical carina which hides the hind margin of the eye in repose; this structure is not present in *Zabrotes*.

C. In *Spermophagus* the intercoxal process of the prosternum, when seen from in front, is acuminate reaching nearly or quite to the apex of the coxa and has a vertical posterior face between the coxae reaching from their apices to the connecting membrane; this process in *Zabrotes*, when seen from in front, is a short triangle separating the coxae for only half of their length without a posterior vertical face.

D. The outer apical lamella of the hind femur is elevated, its apical angle rounded in *Spermophagus* while in *Zabrotes* this angle is acute. The great majority of species of *Spermophagus* are attached to species of Convolvulaceae, a few to Malvaceae (*Hibiscus* and *Urena*), host plants not known to be affected by *Amblycerus* or *Zabrotes*. One African species affects a species of Cassia. Species of *Spermophagus* are found in England, in Sweden and eastward to Japan, south to New Caledonia, Australia, (*Bruchus perpastus* Lea, 1899, from Western Australia being a species of *Spermophagus*) and the Cape of Good Hope, but are in complete confusion, so that application of names is impossible without study of types. No species referable to *Spermophagus* as here restricted has been seen from any American locality.

(9) *Bruchidius* Schilsky, 1905, as originally described is too polymorphic to remain undivided. *Bruchidius quinqueguttatus* (Olivier, 1795) is the designated genotype, Bridwell, 1932. No American bruchid seems congeneric with this species. *Bruchus villosus* Fabricius, 1792, has become established in Massachusetts and in Virginia. It was included by Shilsky in *Bruchidius* under the untenable name *Bruchidius cisti* (Paykull) and is the genotype of a new genus, *Sparteus*, above described.

(10) *Pachybruchus* Pic, 1912. The genotype, *Bruchus coryphae* Olivier, 1795, designated by Bridwell, 1922, is congeneric with the genotype of *Megacerus* Fahraeus, 1833.

ZOOLOGY.—*A new sea anemone from Woods Hole, Massachusetts.*[1] SEARS CROWELL, Miami University, Oxford, Ohio, and Marine Biological Laboratory, Woods Hole, Mass. (Communicated by WALDO L. SCHMITT.)

In 1939, Dr. William J. Bowen brought to me specimens of a small sea anemone taken from the Mill Pond, at Woods Hole. This anemone is noteworthy in several respects: (1) It belongs to a genus hitherto represented by only one species, and that from only one locality, the Isle of Wight in the English Channel. (2) It has evaded observation until recently, even though it is abundant at a location almost in the shadow of the Marine Biological Laboratory. (3) It possesses nematosomes. These are small clusters of cells that bear nematocysts and that move around freely in the coelenteron without permanent attachment to the body of the anemone. These nematosomes are being studied further, since no knowledge of their function or origin exists. (4) It is well suited for study by students in general or invertebrate zoology, in that it is small, transparent, simple in structure, hardy, and available at almost all seasons. It has been used by the classes at the Marine Biological Laboratory and successfully shipped as far as Ohio, where it arrived in good condition.

Genus **Nematostella** Stephenson, 1935

The genus *Nematostella* was established by Stephenson to include those Edwardsidae that could not be referred to *Edwardsia* because of the absence of nemathybomes and that could not be referred to *Milne-Edwardsia* because the outer tentacles are longer than the inner. From both of these genera it differs in the possession of nematosomes. The type species is *Nematostella vectensis* Stephenson, 1935.

[1] Received December 20, 1945.

Nematostella pellucida, n. sp.

Diagnosis.—With the characters of the genus. Length of body in extension up to 20 mm. Width at physa one-sixth the length, tapering to one-tenth the length below the tentacles. Body transparent and entirely lacking in external markings. The transparency makes the insertions of the eight primary mesenteries very evident. Each, as seen through the body wall, appears as a double line, tan or dark brown. The throat is a lighter tan. The lips are conspicuous, being almost white or yellowish. Scapulus not distinct from scapus. Physa well developed but not sharply marked off from scapus. Physa smooth in extension, wrinkled when contracted.

Tentacles 16, rarely less, in two cycles of eight each. In normal expansion the tentacles of a specimen 10 mm long have a length of 4–5 mm in the outer, exocoelic cycle, a length of 3–4 mm in the inner, endocoelic cycle. In extreme expansion the tentacles may slightly exceed the length of the body. Each tentacle bears four or five whitish marks on its inner face, and these are equally spaced along the length of the tentacle. These spots consist of groups of tiny spherical granules in the gastrodermis (endoderm). They appear white by reflected light and dark in transmitted light. (See Fig. 6.) The relationship of the tentacles to the mesenteries is shown by Fig. 2.

There are eight primary mesenteries (macrocnemes). The dorsal and ventral pairs are directive. The muscles of the four lateral mesenteries face toward the ventral directives as shown by the semicircles in Fig. 2. There are no other mesenteries except for eight minute microcnemes. These are restricted to the bases of those adjacent tentacles not separated by primary mesenteries. They do not connect with the body wall itself, since their length is only that of the diameter of a tentacle. Their width is about one-half their length and in a specimen 10 mm long did not exceed 35 microns. Fig. 2 shows their position and width. Fig. 7 is intended to illustrate their insignificance more accurately. The retractor muscles of the primary mesenteries are simple or slightly branched as shown in Fig. 3. The parietal muscles appear as little tufts.

Eggs have been found in specimens less than 10 mm long. These are developed in the usual position on all primary mesenteries, below the throat, between the retractors and mesenterial filaments. While being anesthetized prior to preservation the type specimen discharged 10 eggs and about 100 nematosomes. These were all held together loosely by a mucous substance. The diameter of the eggs is 175 microns. I have no other information concerning the reproduction or life history.

When viewed with a dissecting microscope the nematosomes can be clearly seen through the body wall. A few are usually moving about in the coelenteron. Most of them are at the insertions of the mesenteries in the body wall. Thus there are 16 rows, one on each side of the eight insertions. Within the rows the nematosomes are irregularly spaced. They are easily dislodged but soon return to positions of loose attachment along the mesenterial insertions. Their number is variable. For a specimen 10 mm long there are about 20 on each side of each insertion, or 300 to 400 altogether. Each nematosome consists of 20 to 30 nematocysts, radially arranged, and of flagellated cells responsible for their locomotion. They are nearly spherical with a diameter of 27–30 microns. These bodies, the nematosomes, were first described by Stephenson (1935) and are known only in *Nematostella* and in *Milne-Edwardsia polaris* (Stephenson, 1935, pp. 48, 408).

The types and sizes of the nematocysts are:

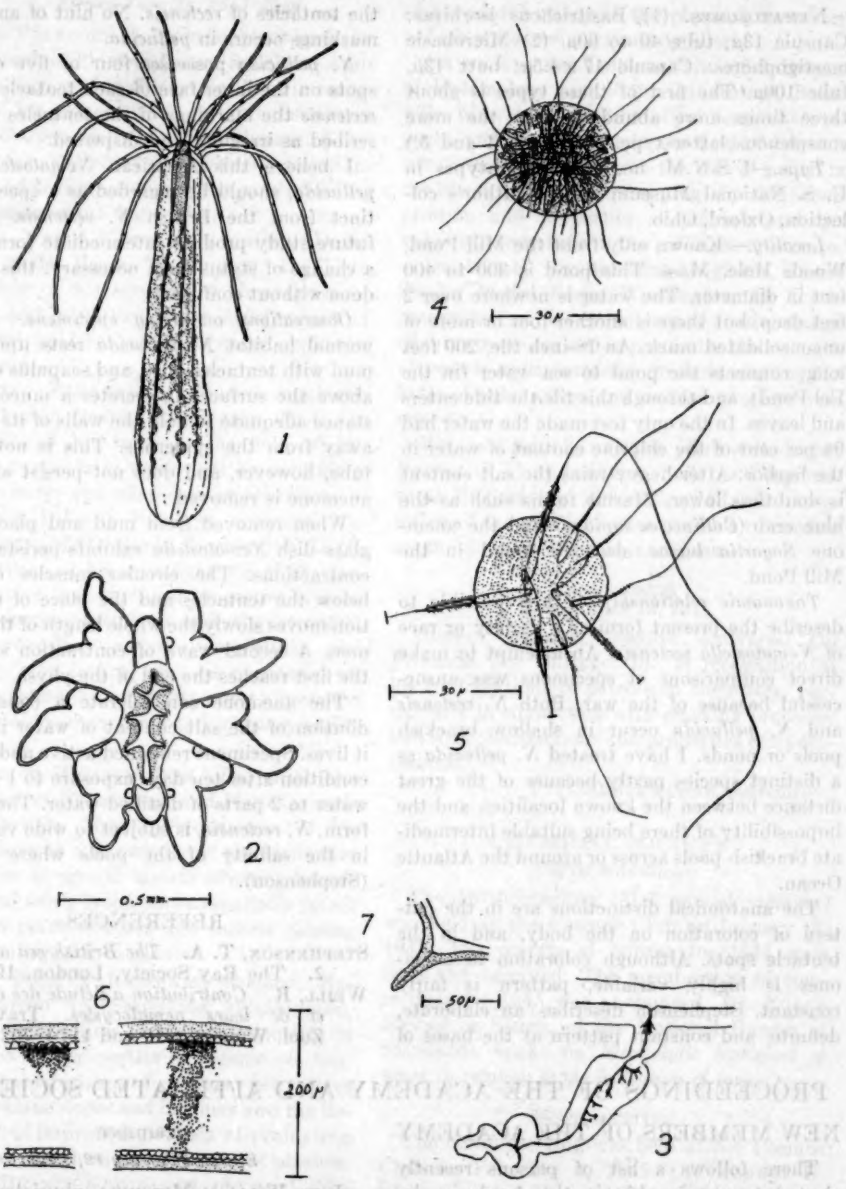
Tentacles. (1) Spirulae (Stephenson) or basitrichous isorhizas (Weill): Capsule 13 to 22μ, typically 18$\times$2.5μ; tube spiny for 18μ; tube length 110μ. (2) Spirocysts: Capsule average length 20μ.

Upper Column. Spirulae or basitrichous isorhizas: Capsule 9.5 to 11.0$\mu\times$2.2 to 2.8μ, average 10$\times$2.5μ; tube spiny for 11μ, tube length 30 to 60μ.

Physa. Spirulae or basitrichous isorhizas: Capsule average 9.4$\times$2.5μ.

Throat. (1) Basitrichous isorhizas: Capsule 18μ; tube spiny for 18μ, tube length 60 to 85μ. (2) Microbasic mastigophores: Capsule 20$\times$ 4.5μ; butt (hampe) 24 to 29μ; total tube length 85μ.

Mesenterial Filaments. (1) Basitrichous isorhizas: Capsule 18μ; tube spiny for 16 to 18μ, total tube length 35 to 55μ. (2) Microbasic mastigophores: Capsule 18 to 23$\mu\times$4.5 to 5.5μ; butt 22μ; total tube length 70μ.



FIGS. 1–7.—*Nematostella pellucida*, n. sp.: 1, Specimen with body length of 10 mm; 2, diagram of an actual section through bases of tentacles, showing relationships of mesenteries and tentacles, location of retractor muscles at a lower level indicated by semicircles; 3, pattern of a retractor muscle just below throat; 4, nematosome with nematocysts undischarged (its flagella shown); 5, nematosome after discharge of some of its nematocysts (diagrammatic), only a few of nematocysts shown (long tubes of 3 of microbasic mastigophores cut off, as indicated by a line ⊥ to tube; smaller nematocysts are basitrichous isorhizas); 6, diagrams showing appearance of granules of tentacle spots with transmitted light, at left tentacle shown in side view, at right it is viewed from its inner face (epidermis stippled); 7, junction of 2 tentacle bases showing a microcneme at its maximum width (gastrodermis stippled).

NEMATOSOMES. (1) Basitrichous isorhizas: Capsule 13μ; tube 40 to 60μ. (2) Microbasic mastigophores: Capsule 17×4.5μ; butt 13μ, tube 100μ. The first of these types is about three times more abundant than the more conspicuous latter type. (See Figs. 4 and 5.)

Type.—U.S.N.M. no. 43763; paratypes in U. S. National Museum and in author's collection, Oxford, Ohio.

Locality.—Known only from the Mill Pond, Woods Hole, Mass. This pond is 300 to 400 feet in diameter. The water is nowhere over 2 feet deep, but there is another foot or more of unconsolidated muck. An 18-inch tile, 200 feet long, connects the pond to sea water (in the Eel Pond), and through this tile the tide enters and leaves. In the only test made the water had 94 per cent of the chlorine content of water in the harbor. After heavy rains the salt content is doubtless lower. Marine forms such as the blue crab (*Callinectes sapidus*) and the anemone *Sagartia luciae* also are found in the Mill Pond.

Taxonomic relationships.—It is possible to describe the present form as a variety or race of *Nematostella vectensis*. An attempt to make direct comparisons of specimens was unsuccessful because of the war. Both *N. vectensis* and *N. pellucida* occur in shallow brackish pools or ponds. I have treated *N. pellucida* as a distinct species partly because of the great distance between the known localities, and the impossibility of there being suitable intermediate brackish pools across or around the Atlantic Ocean.

The anatomical distinctions are in the pattern of coloration on the body, and in the tentacle spots. Although coloration in anemones is highly variable, pattern is fairly constant. Stephenson describes an elaborate, definite, and constant pattern at the bases of the tentacles of *vectensis*. No hint of any such markings occurs in *pellucida*.

N. pellucida possesses four or five definite spots on the inner face of each tentacle but in *vectensis* the markings of the tentacles are described as irregular and dispersed.

I believe this American *Nematostella, N. pellucida*, should be regarded as a species distinct from the British *N. vectensis*. Should future study produce intermediate forms, and a change of status seem necessary, this can be done without confusion.

Observations on living specimens.—In the normal habitat *N. pellucida* rests upright in mud with tentacles, disc, and scapulus exposed above the surface. It secretes a mucous substance adequate to hold the walls of its burrow away from the epidermis. This is not a real tube, however, and does not persist after the anemone is removed.

When removed from mud and placed in a glass dish *Nematostella* exhibits peristalsis-like contractions. The circular muscles contract below the tentacles and the place of contraction moves slowly the whole length of the specimen. A second wave of contraction starts as the first reaches the end of the physa.

The anemone can tolerate a considerable dilution of the salt content of water in which it lives. Specimens remained active and in good condition after ten days exposure to 1 part sea water to 2 parts of distilled water. The British form, *N. vectensis*, is subject to wide variations in the salinity of the pools where it lives (Stephenson).

REFERENCES

STEPHENSON, T. A. *The British sea anemones* 2. The Ray Society, London, 1935.

WEILL, R. *Contribution a l'étude des cnidaires et de leurs nematocystes.* Trav. Stat. Zool. Wimereux 10 and 11: 1–702. 1934.

PROCEEDINGS OF THE ACADEMY AND AFFILIATED SOCIETIES

NEW MEMBERS OF THE ACADEMY

There follows a list of persons recently elected to membership in the Academy, by vote of its Board of Managers, who have since qualified as members in accordance with the by-laws of the Academy. The bases for election are stated with the names of the new members.

RESIDENT

Elected February 12, 1945

JOHN WILLIAM MITCHELL, physiologist, Bureau of Plant Industry, Soils, and Agricultural Engineering, Beltsville, Md., in recognition of his contributions to plant physiology, in particular his researches on plant hormones and growth-regulating substances.

Elected June 18, 1945

SEARS POLYDORE DOOLITTLE, plant pathologist, Bureau of Plant Industry, Soils, and Agricultural Engineering, Beltsville, Md., in recognition of his pioneer work on virus diseases of vegetables, especially of mosaic disease of Cucurbitaceae, including insect-vector relationships, seed transmission of virus, and breeding of disease-resistant vegetables.

EARLE HESSE KENNARD, physicist, David Taylor Model Basin, Washington, D. C., in recognition of his services to the science of physics, and in particular the development of theoretical analyses of underwater explosion phenomena.

MARTIN ALEXANDER MASON, engineer, Beach Erosion Board, Washington, D. C., in recognition of his work in the field of hydraulics, particularly researches on oscillatory waves in water and related shore processes.

DOUGLAS EUGENE PARSONS, engineer, National Bureau of Standards, Washington, D. C., in recognition of his investigations of the factors affecting the structural properties of reinforced concrete members and the strength, elastic properties, water permeability, and durability of masonry; also, his successful efforts to increase the reliability and to lower the cost of reinforced concrete and masonry structures.

FREDERICK WILLIAM POOS, JR., entomologist, Bureau of Entomology and Plant Quarantine, Beltsville, Md., in recognition of his contributions to a knowledge of the bionomics and control of several insects affecting cereal, forage, and truck crops, more especially insect vectors of plant diseases and insects causing disease-like injuries to plants.

FRANK WALTER REINHART, chemist, National Bureau of Standards, Washington, D. C., in recognition of his achievements in research on the properties of organic plastics, the film characteristics of cellulose derivatives used in airplane dopes and lacquers and the development of improved methods of evaluating the physical and chemical properties of plastics.

GALEN BRANDT SCHUBAUER, physicist, National Bureau of Standards, Washington, D. C., in recognition of his work on boundary-layer flow phenomena and wind-tunnel turbulence.

ARNOLD M. SOOKNE, chemist, Milton Harris Associates, Washington, D. C., in recognition of his contributions to the physical chemistry of high polymers, particularly fibers.

FRANK EDWARD TODD, entomologist, Bureau of Entomology and Plant Quarantine, Beltsville, Md., in recognition of his researches, reports, and publications in the field of bee culture, more particularly on the role of pollen in the life of the hive; the trapping of pollen; composition and properties of pollens; and the value of honey bees in the pollination of crops.

DWIGHT F. WINDENBURG, engineer, David Taylor Model Basin, Washington, D. C., in recognition of his contributions to the design of ship structures and in particular the strength of vessels under external pressure such as the hulls of submarines and unfired pressure vessels.

WILLIAM JOHN ZAUMEYER, plant pathologist, Bureau of Plant Industry, Soils, and Agricultural Engineering, Beltsville, Md., in recognition of the excellent quality of his researches on the diseases of beans and peas.

NONRESIDENT

Elected June 18, 1945

GUSTAV EGLOFF, chemist, Universal Oil Products Co., Chicago, Ill., in recognition of his contributions to petroleum chemistry, particularly in connection with cracking processes and with the reactions and properties of hydrocarbons.

F. G. BRICKWEDDE, *Secretary*

CHEMICAL SOCIETY

567TH MEETING

The 567th meeting (61st annual meeting) was held at the Cosmos Club on January 11, 1945. The reports of officers for 1944 were read and accepted. The membership of committees for 1945 was announced. Dr. EDGAR REYNOLDS SMITH, of the National Bureau of Standards, spoke on *Electrolytic transport of water in relation to the hydration of ions.*

568TH MEETING

The 568th meeting was held at the Cosmos Club on February 8, 1945. Dr. ROBERT B. WOODWARD, of Harvard University, spoke on *The total synthesis of quinine.*

569TH MEETING

The 569th meeting was held at the Cosmos Club on February 22, 1945. DR. ROBERT

SIMHA, of Howard University, spoke on *Viscosity, sedimentation, diffusion and molecular weight and shape of high polymers.*

570TH MEETING

The 570th meeting and annual dinner of the Society was held at the Roger Smith Hotel on March 8, 1945. The Hillebrand Prize for 1944 was awarded to Dr. RAYMOND M. HANN, National Institute of Health, in recognition of his work on the chemistry, synthesis, and structure of the methylene and benzylidene acetals of sugar alcohols. Dr. CLIFFORD B. PURVES, of McGill University, spoke on *Cyclic acetals of carbohydrates*, to be published in this JOURNAL.

571ST MEETING

The 571st meeting was held at the Cosmos Club on April 5, 1945. Dr. E. G. ROCHOW, of General Electric Co., spoke on *Organosilicon polymers.*

572D MEETING

The 572d meeting was held at the Cosmos Club on April 12, 1945. Dr. W. F. JACKSON, of the Explosives Department of E. I. du Pont de Nemours and Co., spoke on *General properties of gun propellants.*

573D MEETING

The 573d meeting was held at the University of Maryland on May 10, 1945. At the general meeting the Borden Award for research in the chemistry of milk for 1945 was presented to Dr. BEN H. NICOLET, of the Bureau of Dairy Industry. At the conclusion of the general meeting, the following divisional meetings were held:

Biochemistry, J. R. SPIES, *presiding*

Studies on the sex attractant of the female gypsy moth. H. L. HALLER and FRED ACREE, JR. (Bureau of Entomology and Plant Quarantine).

The metabolism of DDT. HERBERT O. CALVERY, GEOFFREY OFNER, and RUTH OFNER (Food and Drug Administration).

On the mechanism of the enzymatic oxidation of catechols. HOWARD S. MASON (National Institute of Health).

Inorganic and Analytical Chemistry, A. GABRIEL, *presiding*

A rapid fluorescent method for determination of Beryllium in ores. MARY H. FLETCHER, CHARLES E. WHITE, and MILTON S. SHEFTEL (Bureau of Mines).

Spectrophotometric determination of titanium in steels. ALFRED WEISSLER (Naval Research Laboratory).

Standardization of acid with KIO_3. PETER OESPER (University of Maryland).

Anion exchange in soils. L. A. DEAN and E. J. RUBINS (Bureau of Plant Industry, Soils, and Agricultural Engineering).

Organic Chemistry, JOHN K. WOLFE, *presiding*

DDT: A new synthetic organic insecticide. H. L. HALLER (Bureau of Entomology and Plant Quarantine).

A method for the measurement of gel strength and data on starch fractions. W. J. HAMER (National Bureau of Standards).

Cis-trans isomers of 3-(alpha-naphthyl)-1-propene. T. H. HARRIS and C. M. MACKALL (George Washington University).

The oxidation of melezitose with periodate. N. K. RICHTMYER and C S. HUDSON (National Institute of Health).

Physical Chemistry, W. J. SVIRBELY, *presiding*

Dipole moments of diethyl sulphite, triethyl phosphate, tetraethyl silicate and carbowax 4000. J. J. LANDER and W. J. SVIRBELY (University of Maryland).

Methods of calculating the properties of hydrocarbons and its application to the refractive indices, densities, and boiling points of the paraffin and monoolefin hydrocarbons. W. J. TAYLOR, JOAN M. PIGNOCCO, and F. D. ROSSINI (National Bureau of Standards).

Heats and free energies of formation of the paraffin hydrocarbons in the gaseous state at 1500° K. E. J. PROSEN, K. S. PITZER, and F. D. ROSSINI (National Bureau of Standards).

The freezing temperature of benzoic acid as a fixed point in precision thermometry. F. W. SCHWAB and E. WICHERS (National Bureau of Standards).

574TH MEETING

The 574th meeting was held at Georgetown University on October 11, 1945. At the conclusion of a general meeting, the following divisional meetings were held:

Biochemistry, M. X. SULLIVAN, *presiding*

The cystine and methionine content of various proteins and diets. W. C. HESS (Chemo-Medical Research Institute, Georgetown University).

Chemical methods for the assay of penicillin M. MUNDELL and D. C. GROVE (Food and Drug Administration).

Desaminases for nucleic acids. J. P. GREENSTEIN and A. H. CHALKLEY (National Cancer Institute).

Tests for various biogenous amines. M. X. SULLIVAN (Chemo-Medical Research Institute, Georgetown University).

Inorganic and Analytical Chemistry, R. GILCHRIST, *presiding*

Separation of radioactive arsenic from copper and germanium. A. T. NESS (National Institute of Health).

Method for the determination of small amounts of gold and its use in ascertaining the thickness of electrodeposited gold plate. W. S. CLABAUGH (National Bureau of Standards).

A new method for the determination of phenolic fungicides. S. GOTTLIEB and P. B. MARSH (Bureau of Plant Industry, Soils, and Agricultural Engineering).

Spectrophotometric determination of tyrosine and tryptophane. H. R. MULLIN (National Bureau of Standards).

Organic Chemistry, H. L. HALLER, *presiding*

A study of the dehydrochlorination of some DDT analogues and of the benzene hexachlorides. S. J. CRISTOL (Bureau of Entomology and Plant Quarantine).

Oxidation of hydroquinone in the presence of pyridine. H. W. BAERNSTEIN (National Institute of Health).

New antimalarials. E. L. MAY (National Institute of Health).

The determination of estrone in blood. F. P. VEITCH (Georgetown University School of Medicine).

Physical Chemistry, H. S. MASON, *presiding*

The use of radioactive sodium in the measurement of flow of large volumes of water. D. B. COWIE (Carnegie Institution of Washington).

The application of the ultracentrifuge and associated instruments to particle analysis. H. KAHLER (National Cancer Institute).

Spectrographic methods applied to photoperiodic response of plants. S. B. HENDRICKS and M. W. PARKER (Bureau of Plant Industry, Soils, and Agricultural Engineering).

575TH MEETING

The 575th meeting was held at the Cosmos Club on November 8, 1945. Dr. BEN H. NICOLET, Bureau of Dairy Industry, spoke on *Some aspects of the chemistry of phospho-proteins.* The election of officers for 1946 was held with the following results: President, L. A. SHINN; Secretary, I. C. SCHOONOVER; Treasurer, J. J. FAHEY; Councilors, N. BEKKEDAHL, W. C. CAGLE, N. L. DRAKE, W. L. HALL, H. L. HALLER, S. B. HENDRICKS, H. S. ISBELL, B. H. NICOLET, E. J. PROSEN, E. R. SMITH, M. X. SULLIVAN, W. J. SVIRBELY, J. K. WOLFE; Managers, R. GILCHRIST, B. J. MAIR, A. T. MCPHERSON, R. A. OSBORN, H. A. RUTHERFORD, J. L. SVIRBELY.

576TH MEETING

The 576th meeting was held at George Washington University on December 13, 1945. Dr. JAMES F. COUCH, Chief of the Tobacco Section of the Eastern Regional Research Laboratory, spoke on *Rutin and the vitamin P effect.*

LEO A. SHINN, *Secretary*

Obituary

SOFIE AMALIA NORDHOFF-JUNG, distinguished physician, died in Washington, D. C., on June 6, 1943, after a long illness. She was born in Bielefeld, Westphalia, Germany, on April 25, 1867. She received her early education at the parochial school at Bielefeld until her fourteenth year, when, following the Nordhoff tradition, she continued her studies at Sacred Heart Convent, Toul, France, until 1884. Shortly afterward the family came to America, where Dr. Jung accepted a position as teacher of French and German at Georgetown Convent, Washington, D. C.

Father Murphy, chaplain, suggested that she take up the study of medicine, which she did at Columbian College, now George Washington University, receiving her degree in 1893. She then went to France and continued her studies at the Pasteur Institute in Paris under Louis Pasteur as one of the few American pupils

of the great scientist. Later she went to Munich to perfect herself in the special field she had chosen, was made clinical instructor in obstetrics at the University Hospital in Munich, and later resident physician at the Frauenklinik.

She met Dr. Franz A. R. Jung on her return trip to America, and they were married shortly afterward. They established their offices at 1229 Connecticut Avenue in Washington, building the house according to special plans suitable for offices and residence, and here they engaged in private practice from 1897 to 1923.

In 1914 she and her husband took their usual summer trip to Europe, she having accepted an invitation to work in Prof. Gustav Klein's clinic to study his methods of treating uterine cancer, in which she had become greatly interested while working with him the previous summer. She and her husband had hardly arrived in Munich when the war broke out, and they with hundreds of other Americans were stranded.

Red Cross work was started and a call for volunteers was sent out, to which she and her husband promptly responded. On request, lectures on First Aid were given by her to hundreds of Americans. These lectures were such as she had been giving in Washington under the auspices of the Red Cross for 20 years. Through the efforts of Ambassador James W. Gerard, a Red Cross Hospital was organized, and on September 23 the Stars and Strips were hoisted over the building at No. 9 Prinz-Ludwig-Strasse. It was called the American Model Hospital and was a success from the very beginning. Ambassador Gerard was president of its board and mentions its work in his book, *My four years in Germany*. During the two and a half years of the existence of the hospital the Jungs remained in charge, giving all their time and energy gratuitously, leaving it only to sleep and eat in a nearby family hotel. When diplomatic relations were severed, the hospital was closed on February 26, 1917. During this period of uninterrupted overwork and lack of nourishing food, the health of both of them gradually gave way completely. Forced by the revolutions to remain on in Munich, and without funds, they were unable to return to the United States until December 31, 1919. As a result of overwork and undernourishment, Dr. Franz Jung died in Washington in January 1923.

On March 10, 1927, the German Government awarded Dr. Sofie A. Nordhoff-Jung the official Cross of Honor of the German Red Cross in recognition of the distinguished services she had rendered during the war in Germany. The medal was presented by Baron Maltzan, the German Ambassador, with an accompanying diploma and note of congratulation.

In 1923 Dr. Nordhoff-Jung became instructor of gynecology at Georgetown University Hospital. In 1932 she was made associate professor in gynecology, and in 1939 she became professor emeritus of gynecology.

For many years she had been interested in cancer research, and she established a prize for scientific research in this field. Father Nevils, of Georgetown University, on page 20 of his *Miniatures*, says: "In her great zeal for scientific advance in cancer research Doctor Jung has set aside a fund whereby every second year a cash prize of one thousand dollars with a beautifully inscribed citation is awarded the scientist who, according to the selection of a special committee, has done outstanding work in cancer research." In 1927 the prize was given to Dr. Otto Warburg, director of the Department of Biology of the Kaiser Wilhelm Institute, Berlin-Dahlem. In 1930 it was awarded to Dr. Alexis Carrel, of New York.

As a memorial to her husband, who was a distinguished gastroenterologist, Dr. Jung donated the fourth floor of the Nurses' Home at the Georgetown University Hospital, where a plaque commemorates this gift. For a number of years she was a benefactress of the Georgetown University Hospital, and upon her death she left a legacy of approximately $200,000 in trust to it.

Dr. Jung was a member of the Anthropological Society of Washington for about 15 years, of the Medical Society of the District of Columbia for about 46 years, and of the Washington Academy of Sciences for about 44 years.

ANNA BARTSCH DUNNE.